Better Crops with PLANT FOOD

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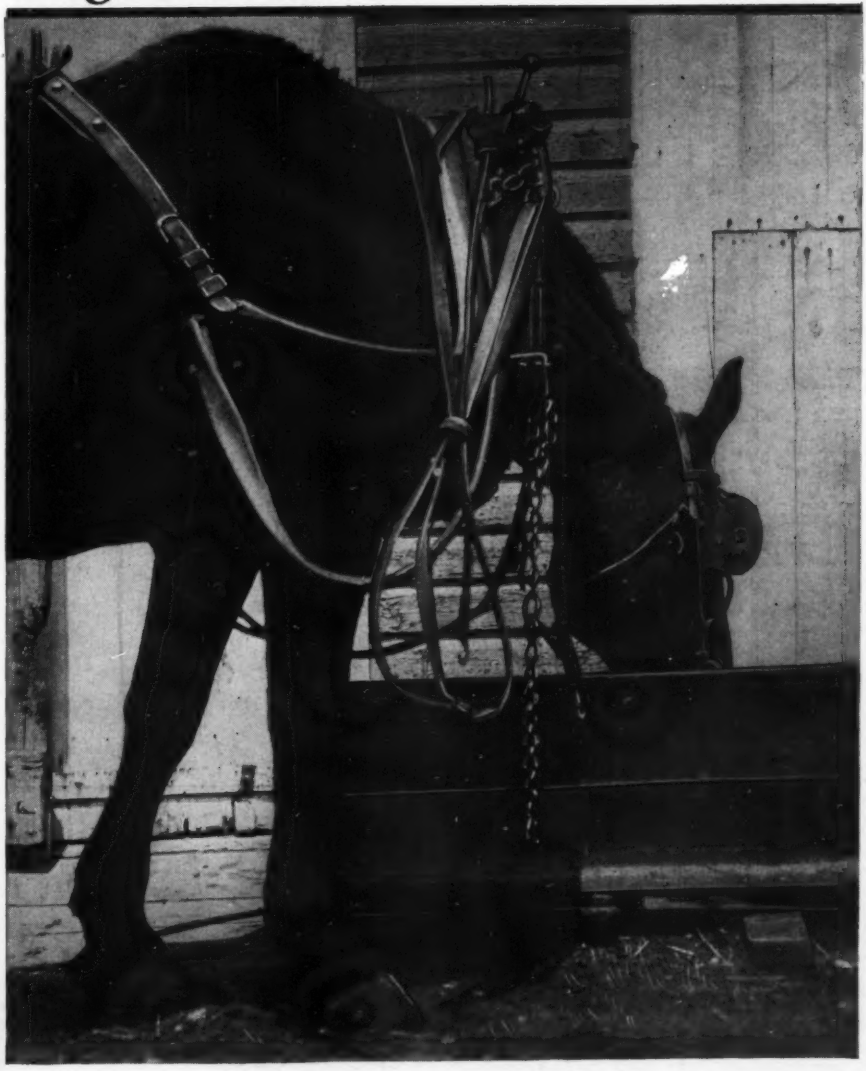

The Pocket Book of Agriculture

About Ourselves

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Better Crops with PLANT FOOD

The Whole Truth—Not Selected Truth

R. H. STINCHFIELD, *Managing Editor* SID NOBLE, *Editor*
Editorial Offices: 19 West 44th Street, New York.

VOLUME IX NUMBER THREE

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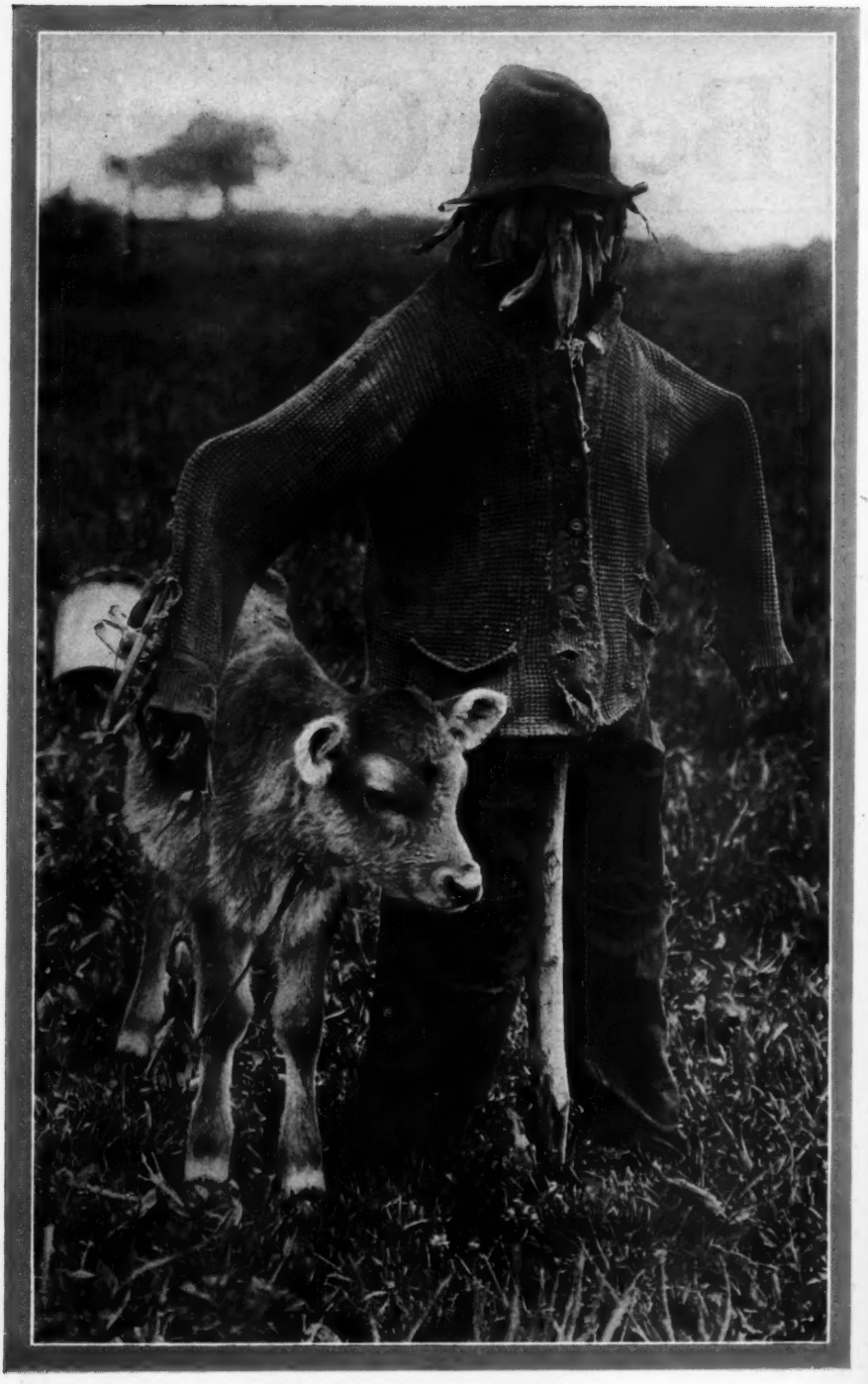

His Master's Clothes.

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Jeff McDermid *the genial philosopher writes on*

LOOKS

MANY of us openly applaud the old wheezes, "Handsome is as handsome does," and "Beauty is only skin deep" while we secretly wish for the pulchritude that nature has denied us.

Hypocrisy never gets us far in any thesis, so we might as well dispose of the error at the outset by a frank admission that we *could* use a mirror to better advantage and with more personal satisfaction were things otherwise ordained.

The aforesaid consoling and admonishing maxims belonged to the era of Calvinistic faith, along with log cabins, prairie schooners, hoop skirts and side whiskers.

Folks were so busy making empires and fighting Indians that the ornamental side of human architecture was of less immediate concern than the stability and resistant qualities of it.

Nobody can tell whether Daniel Boone or Kit Carson had romantic eyes or classic profiles, but everybody conjectures that they carried plenty of war paint in their saddle bags. The only kind of "make-up" they hankered for was an occasional treaty with the savages.

So we may well conclude that those mottoes of the vanished era relative to looks have become obsolete. Men no longer consider it a waste of time or a sin to have a face that won't stop the clock.

HAVING admitted that we take a good look at good looks whenever found, and that we all yearn for our share of it in some form, we can proceed to a further enlargement of the fascinating subject.

Good looks and looking "good" (well) are not always synonymous.

There are two kinds of good looks —physical beauty and whole appearance.

To be physically beautiful in the purest degree calls for the proper attractions of feature plus a wholesome glow of radiant health and cleanliness.

One cannot be truly beautiful with-

out being wholesome; but one can be wholesome and yet lack regularity and charm of facial beauty.

Therefore, the key to desirable appearance lies in being wholesome. It is the main ingredient of the ideal beauty prescription.

This probably explains why the white explorers mostly sought in vain for the lush Indian beauties that lived in such exotic numbers in the pages of fiction. The smoky tepee, the squalor of savagery and the absence of sanitation robbed the red girl of her charms even before she learned to chew tobacco and rub her cheeks with bears' grease.

Personally, I have always suspected that Capt. John Smith loved Pocahontas less for her looks than because she had a stand-in with the big chief.

But why after all should we abjure the shy daughters of the forest for lacking the wholesomeness to be called divine? They did not camp long enough in one spot to collect sufficient meat scraps to boil a mess of soft soap. Besides, after their husbands and lovers had gone on the war path there wasn't enough paint left to daub over their own deficiencies.

ON the other hand, do we not find that the modern nymph has for her artful slogan the famous words of commerce: "Save the surface and you save all!"

Any reputable painter will tell you that there are two requisites to a durable and pleasing job; viz, a thoroughly clean surface and pigments that are not too glaring and incongruous. If Milady would get those essentials taught to every apprentice, there would be more satisfaction alike to be-dauber and beholder.

Yet in this age of so much purchased pulchritude I get a crumb of comfort out of the thought that the drug clerk says there are more cosmetics sold than patent medicines. It is far better to see a parade of gorgeous Grandmas with vermillion cheeks than to see them drinking Lydia Pinkhams or hear them swapping hospital experiences. I can stand eye-strain better than heartache.

But artifice and disguise, as such, do not well belong to a discussion of looks. Some day when the subject of *shams* is in order, perhaps the mask can be torn off through these columns in quite ruthless fashion.

LET me ponder now upon looks in their natural state, keeping foremost in mind the wholsesome side of good appearance.

Emerson rightly says, "If eyes were made for seeing, then beauty is its own excuse for being."

The romantic poet, Keats, is often partly quoted in the phrase, "A thing of beauty is a joy forever." I only get the "skin deep" significance until I read further, and then I see again that wholesomeness is the prize he praises most. Get the rest of his statement, little known and very seldom quoted in full:

"Its loveliness increases, it will never pass into nothingness, but still will keep a bower quiet for us and a sleep full of sweet dreams and health, and quiet breathing."

Thus no poet who valued his reputation ever raved about good looks without going to the soul of it, which is wholesomeness.

Looks also depend upon the beholder's own standards and mental outlook. Two quotations illustrate this in short order: First, the Indian who said he was thankful that all men did not see alike, or they would all want his squaw. Second, Pope remarks: "All is infected that infected spy, as all looks jaundiced through the jaundiced eye."

Translated into our own tongue, when you say that a dame is a "good looker," you merely mean that you yourself are a *good looker*. Your male neighbor may be looking in the op-

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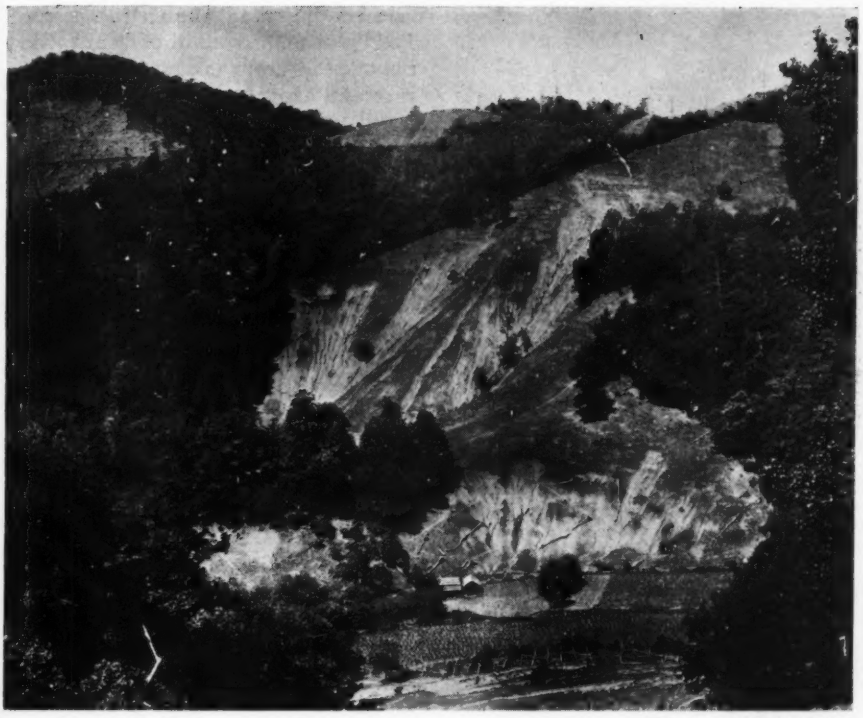

U. S. FOREST SERVICE

A clearing in the Blue Ridge Mountains where cultivation was immediately followed by disastrous erosion. These steep mountain slopes are ideal forest lands. To clear them for crops is nothing less than criminal trespassing upon nature; for the soil soon goes, leaving behind gullied areas having little value even for trees.

The SOIL Robber

By HUGH HAMMOND BENNETT
U. S. Department of Agriculture

SOIL erosion takes from the farmers' pockets an annual toll of at least $200,000,000. This is a modest estimate based on analysis of widely distributed soils, and it does not take into account the expensive cumulative effect of the increasing difficulty of cultivation occasioned by removal of the mellow topsoil and the need for more and more fertilizer material to enrich the exposed raw subsoil material; nor does it count the taxes paid on land abandoned by reason of soil poverty brought about by this master thief.

Every rain that falls upon sloping areas takes away part of the soil, and that from the surface layer, the richest of the fields. Even the gentle rains of springtime that fall like music upon budding foliage do not neglect the mission of water, that is, to level down the face of the earth.

Next time you find yourself in the rural districts after a downpour, if you look, you will see water speeding away

DIV. OF AGR. ENG., U. S. BUREAU OF PUBLIC ROADS

Showing the efficient work of a terrace in checking rain water rushing down a slope. The embankment leads the water off gradually and thus reduces its soil-stripping effectiveness.

to the rivers and oceans, not crystal-clear, but muddied to dun, yellow or red, according to the color of the soil of the locality. This color will represent soil washed out of cultivated fields. Little of it comes from woodlands.

A Difficult Problem

EROSION is the most difficult problem of soil management on most of the rolling lands of the nation. The National Industrial Conference Board recently stated that our farmers suffer an annual net loss of 5,900,000,000 pounds of plant food removed in crops taken off. This loss is serious enough, but it is small compared with that caused by erosion. The eminent geologist, T. C. Chamberlin, said that 1,000,000 tons or more "of richest soil-matter" is carried into the sea every year. Not less than twice this amount is taken out of the fields and left stranded on slopes and distributed over stream bottoms or deposited in channelways where it is not needed. Certainly 20 times as much plant food is wasted by the relentless washing of rainwater than is taken out of the soil by crops, and since the whole soil, not merely the plant nutrients, is removed, the actual loss by this force is again multiplied. The minimum estimate of the loss exceeds 126,000,000,000 pounds of plant food annually.

Much of this waste takes place so gradually, by a process known as sheet erosion, that the farmer scarcely notices it while it is going on. Even when soil has been planed down to infertile raw clay, with frequent spots of bedrock showing through fields, he usually ascribes his reduced yields to "soil exhaustion," abandons field after field, and often decides he has lost the touch for farming and moves away to town or to another community to exhaust another farm.

A Piedmont slope saved by terracing. These rolling lands are very susceptible to destructive washing; but most of them can be preserved indefinitely by proper and timely terracing.

The Missouri Agricultural Experiment Station measured the rate of erosional soil loss from fields undergoing a variety of cultural treatment, by catching the material at the foot of the slope and weighing it. It was found that seven inches of topsoil was being washed off every 24 years from corn land given ordinary cultivation. From bluegrass sod, however, the rate of land wearage was seven inches in 3,547 years. Reporting on the results of their investigations the scientists of this station said:

"Most of the wornout lands of the world are in their present condition because much of the surface has washed away, and not because they have been worn out by cropping. Productive soils can be maintained through centuries of farming if serious erosion is prevented. The soils of Missouri have become gradually less fertile during the last 100 years due in large measure to excessive cultivation of rolling fields. Many of the most fertile soils in the rolling prairies and timber lands of this state have been kept in corn until the "clay spots" are evident on nearly every hillside. So much soil has been lost from even the more gently rolling parts of the fields that yields are far below those obtained by our grandfathers who brought the land into cultivation. The erosion of cultivated fields is taking place at such a rate that it is calling for a decided change in our system of soil management. If we are to maintain our acre-yields at a point where crops can be produced at a profit we must make every reasonable effort to reduce the amount of soil fertility that is carried off during heavy rains."

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Gullies often have their beginning in the middies of crop rows run up-and-down slopes. On all slopes the rows should follow the contours, but not cross them.

This process of land depreciation goes steadily on in nearly every agricultural county of the United

This one-time productive field has been permanently destroyed by erosion. More than 10,000,000 *acres in the United States have been ruined by this untiring agency of soil wastage.*

States. It is worse in rolling regions than on flat plains to be sure, and in some localities of peculiarly vulnerable soil conditions it despoils the land like an unharnessed demon.

Monuments to Wastage

IN a single county of the Piedmont region 90,000 acres, as measured by an actual survey of the Department of Agriculture, were classed as rough gullied land. This was formerly cultivated; it is now utterly ruined, save for a few unimportant islands and peninsulas between hideous gullies. Bedrock is exposed in thousands of places. Centuries will be counted before arable soil again develops on most of this area.

Not far from this locality another county is the possessor of more than 60,000 acres of formerly rich land, which has been ruined in similar manner. Some of this has been so gullied that pine trees will not grow on it. At one place where a school house stood 40 years ago, one can look out over hundreds of acres hideously dissected with gullies, some of which are more than 200 feet deep.

The human tragedies these devastated areas could tell will be remembered only by the monuments of gullies and ravines left to mar the landscape.

Hundreds of counties in many parts of the country from the northernmost states to the Gulf of Mexico include small, large, and enormous areas of land made unfit or seriously impaired for farm use by this demoniacal agency. Not less than 10,000,000 acres of formerly cultivated land have been permanently destroyed in this country by erosion. Several additional millions of acres of rich bottom land have been buried with inert sand and gravel or converted into overflow swamp by choking of stream channels with soil debris washed out of upland fields. Along one creek where observations were carefully made, rich alluvium has been buried during the past 15 years to a depth of 20 feet with valueless sand assorted and deposited by rushing currents from soil material derived from tilled upland. In the lower Mississippi Valley some towns at which freight and passenger boats formerly called have not seen a boat for more than a generation, because the rivers have been choked with excessive sediments washed down following the clearing of timber from all kinds of uplands.

The Scourge of the Fields

BUT this more spectacular form of land despoiliation is the lesser evil. The real scourge of the land is that type of erosion which proceeds gradually and quietly but none the less destructively. Here is the spigot through which thousands of tons of fertility flow out as irreclaimable waste, lost forever to the fields whence it comes.

With our vast land resources, we have given little thought to soil conservation. We have been too busy with other things. Of course, several millions of farmers have been thinking about it for many years. To them erosion has been a nightmare; a relentless enemy difficult to combat. With the overproduction of some agricultural products in recent years and the constantly recurring admonitions to eat more meat and to wear more and longer dresses of cotton, many will be inclined to feel perfectly at ease about the problem of soil wastage. This point of view is precisely like that held a few years ago by those who said our forests were inexhaustible. They were exceedingly wrong. At this time a shortage of lumber is not a matter of the future but is already with us. Our lumbermen are entering the forests of British Columbia and even Nicaragua, and wood supplies are coming to our ports from abroad.

The foresters of the country, however, are performing a very great service in their efforts to preserve timber on the watersheds of streams and to restore forests to waste areas. Re-

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The Country's Needs

Address of W. M. Jardine, Secretary of Agriculture, to the Country Life Conference

EDITOR'S NOTE—*In an address made August 1 at East Lansing, Mich., before the Country Life Conference, Secretary of Agriculture Jardine talked understandingly of some of the broad changes that are occurring in rural life and told of some of the things that are needed to put rural districts culturally and economically on a level with urban communities. The following excerpts will show the trend of his thought.*

IN recent years not only has the per cent of rural population decreased, but the number of people actually living on farms fell from 32,000,000 in 1910 to fewer than 28,000,000 in 1927.

A certain part of this movement is due to the natural long-time adjustment which will always go on between industrial and agricultural activities and methods of earning a livelihood. It is a healthy movement. It need not operate to the disadvantage of agriculture.

So long as we have adequate production, our main interest is not in reducing numerically the movement from farms to cities. Rather, our problem is to keep on the farm those men and women who know rural life, who love it, and who can contribute substantially to its development.

Economic Reward

THE economic aspects of farming have been so thoroughly and sincerely studied that from all our efforts must come some sound solution to the problem of making the economic reward of rural endeavor as great as that of city endeavor. Indeed, progress is being made. We have come a long way since the worse depression of 1921. Essentially related to this improved economic situation is the growing tendency of farmers to handle their business in a cooperative way. Last year more than one-fifth of all agricultural products were marketed cooperatively. This, in itself, is a genuine sign of progress in rural life, for what the farmers accomplish through cooperation is a permanent contribution to better farm conditions. In order that cooperative action may gain in volume and effect, it is necessary that we train our rural population in its fundamental principles. Happily, this is being done to a large extent in our colleges and secondary schools. I believe the instruction should be extended to our elementary schools. All this education and development will lead to a more stable and equitable farm income and at the same time will, by reason of its opportunities for leadership and service, stimulate men of ability and vision to remain in the country.

Obviously, however, many of those who leave the farms—and not a few of them are highly competent—are moving to town to give their children and themselves the benefits of the city's standard of living. What happens when a fairly well-to-do farmer moves to the city? He either sells his farm or places a tenant in charge. If the latter occurs, the farm must then support two families. The new man, as a general rule, has his fortune to make out of the soil. The prosperous farmer takes to the city with him his

years of experience and education in business-like farming, his wealth which was produced on the land, and his desire to live a more comfortable life. The rural neighborhood, school, club, church, and local government lose a substantial supporter. Even if he retains ownership of the farm, his income from the land is usually spent in the city. Should he sell the farm outright, that wealth goes to build up the city and its business. By remaining on the farm, the fairly well-to-do man could do much to raise the standard of living in his community. In moving to the city, he enters an entirely new environment with a good chance of being a misfit in the new surroundings.

Happiness at Home

ONLY a month ago I visited several farms in Kansas. For thirty years Mr. Taylor and his family have lived on a 160-acre piece of land in the central part of the State. Taylor himself has retired; but he continues to live on the farm; his sons are in charge of the actual operation. The farm home has a small, but good library. There are a fireplace, a radio, and a piano. Shrubs and trees shade and beautify the home. The house, pump house, and barn are equipped with electricity. There is running water in the house. Mr. Taylor has even laid out a nine-hole golf course on a hilly section of his land; that particular piece of land is grazed by sheep. All that Mr. Taylor and his family have was made from the land. That wealth has been invested right at home. His family is benefited. The entire community is benefited.

Just across the road is another farm. Its soil is as rich and as productive as Mr. Taylor's farm. Ten years ago its owner felt that he had sufficient money to move to town. He placed a tenant in charge. Today the foundation on that farm is rotting. There are few trees and no shrubs. The land produces bountifully, but the income seeps to the city. Ten years ago the farm offered better living conditions

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Good country churches can contribute greatly to a wholesome rural community life and thus make farm life more attractive. This is the Stidham Memorial Church at Taylor Station, Tippecanoe county, Indiana.

Storing for Profit

Here's a discussion of the pros and cons of the problem of holding crops for better prices

By ARTHUR P. CHEW
U. S. Department of Agriculture

SCIENCE blows up many fallacies, but occasionally it confirms some dearly cherished popular belief. Economists are now confirming the belief held by many farmers that there is money to be made in storing crops for better prices. Surplus commodities, when injudiciously flung into the market, force down prices lower than is necessary, and the opposite policy of wise storing has in it possibilities of profit. That is declared today by certain very competent economists, including men high in the councils of the United States Department of Agriculture.

Usually, however, a popular idea that gets the stamp of scientific approval undergoes some refinement and modification first. This question of storage and its economic consequences is no exception. Farmers commonly think they would be able to beat the grain market or the cotton market if only they did not have to sell their crops just when everybody is selling. Their idea is that prices are always lower at harvest time than they ought to be, because speculators take advantage of the farmer's need for cash to pay his bills. In that view there is a grain of truth and a bushel of error.

Collective Storage

WHEN the modern economist advises storing crops as a means of preventing price declines, he is not thinking of storage on individual farms or storage by individual producers. It is collective storage that he has in mind.

Moreover, he makes it plain that if the storers are to get the benefit of their work, rather than nonstorers, or the general consuming public, the conditions of a complicated and exacting technique must be observed. Individual farmers storing their own crops, or even quite large groups storing products collectively, are more apt to lose than to gain, because outsiders take advantage of the temporary scarcity thus created and rush their supplies to market. When the storers want to sell their holdings, they find the demand satisfied and the price falling.

Mordecai Ezekiel, an economist in the Department of Agriculture, puts the matter this way: *Storing surplus supplies will give increased returns to farmers under certain conditions; but all the gains of the storing operation will go to farmers who take no part in it unless the cost of storing is spread over a very large proportion of the producers.*

That is a little different, is it not, from the notion that there is a sure profit to be made by any farmer who holds his crop until the bulk of the supply has passed into consumption? Many a farmer who thinks he is making a profit by holding back his crop ought to check his optimism by close figuring on interest charges, insurance, storage costs, and shrinkage. It is a mistake to suppose that there is *always* a substantial rise of prices after the marketing season is over.

If storing supplies is to raise prices, it must be done on a scale big enough to lessen materially the movement of supplies to market. More-

over, the nonstorer, who takes the cream off a market as soon as it rises, must be dealt with. Otherwise, storing surpluses brings only disappointment and heart-burning. Storing for the benefit of those who neither fish nor cut bait is neither ethics, economics, nor good sense.

Mr. Ezekiel has worked out the results that might be expected from limited collective storing operations in the case of cotton. They show, with overwhelming logic, that all the gains would go to nonstorers and all the losses—and they would be heavy—to the storers.

How It Pans Out

HERE is about how it would pan out. You can estimate the probable effect of withdrawing a certain amount of cotton from the market from the relation that has existed previously between cotton supplies and cotton prices. There is a possible margin of error, because you cannot exactly foretell how a market will react to the knowledge that a certain amount of stored products is being deliberately withheld. But in a general way the storing of, say, 4,000,000 bales of cotton would probably have temporarily about the same effect on the price of cotton as if the total supply had been that much smaller.

Let us assume then, with Mr. Ezekiel, that a small group of farmers store 4,000,000 bales of the 1926 cotton crop. Let us assume further that the 1927 crop amounts to only 12,000,000 bales. The combination of circumstances, through its effect on prices, would make the two crops worth about $200,000,000 more than they would otherwise be worth.

Hooray, you say! But stop a minute. Who is going to pocket the extra $200,000,000? The fellows who make it available by withholding 4,000,000 bales from the market? Not at all. It would go entirely to the cotton growers who sold at the peak of the market, and they would be the nonstorers because the storers would be busy holding back their supplies so as to keep prices up.

The Storers' Loss

WHAT would the storers get? Profit? No. They would pocket a thumping loss, estimated by Mr. Ezekiel at about $20,000,000. This would be incurred from the fact that the extra 4,000,000 bales in the carryover at the end of the 1926-27 season would make cotton worth considerably less in 1927-28 than in 1926-27. Obviously, the depressing effect of the carry-over on the price for the 1927 crop would fall with disproportionate weight on the storers, because the non-storers would have disposed of all their 1926 production at the favorable price established for that crop at the storer's cost.

It is perfectly true that the storing operation would show a big profit for the cotton growers as a group. But the distribution of the profit would be inequitable. It would be necessary, says Mr. Ezekiel, for the storers to control at least 30 per cent of the crop, just to break even. They would not lose any money with 30 per cent of the crop in their control. But neither would they make any money. They would simply put about $200,000,000 in the jeans of the non-storers.

If a group of farmers controlled half the crop, and stored 4,000,000 bales of it, its members would profit to the extent of $70,000,000. But nonstorers would profit to the extent of $168,000,000. Storers could earn an extra profit of $155,000,000 by storing 4,000,000 bales if they controlled three-quarters of the crop. Even then, however, they would be making a present of $83,000,000 to nonstorers.

As to the moral, you can take your pick of several. It may occur to you that storing in any case is not worth the trouble, since even a 100 per cent line-up of American cotton growers

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An abundance of plant food makes plenty of wheat shocks and good returns for the grower.

WHEAT PROFITS

A discussion of what the present and future seasons promise in profit from winter wheat

By C. A. LeClair

St. Louis, Missouri

WILL it pay today to grow wheat that brings a dollar or less per bushel at the farm? This is what every intelligent winter wheat grower is asking himself right now and in the next breath he queries what are the chances of better prices prevailing in the years ahead. Or, shall he plan to continue growing his usual acreage of wheat or go more largely into raising other crops?

Perhaps winter wheat has been his major money crop for years. His father before him most likely depended upon it as an important source of income. To abandon or even curtail the culture of such an important crop requires more than snap judgment. It is advisable, therefore, to take the long view, weighing the history of wheat culture through years, and, so far as the signs reveal, conclude what the future holds.

Wheat, the staff of life, has been a crop of major importance ever since the dawn of civilization. It was one of the first crops introduced in Amer-

ica in colonial days and has held a place of major importance ever since. Because it is largely utilized for human consumption it has always been a cash crop. In frontier days the relative value of wheat as compared to any other crop of an equivalent bulk that could be grown and its constant demand made it the main contributing aid to a permanent settlement. Even today wheat is still one of the most important crops of the frontier settlers of our western plains area.

Pioneer Wheat Growers

THERE were good farmers and inefficient ones in colonial days just as at present. A consideration of the problems of the best wheat growers in those times will be perhaps the most enlightening. It happens that George Washington was one of early America's great agriculturists. His contributions to increasing efficiency in agriculture, although not generally heralded, rank relatively with his accomplishments as a patriot and statesman. Up to the birth of this country, the early colonists sowed and harvested their grain crops not very differently than in the time of Abel. However, on the extensive lands of the father of this country the beginnings of the science of agriculture began to be applied. It is related that George Washington, who grew in some years as many as 700 acres of wheat, had to learn by costly experience that early sowing of winter wheat was disastrous because of the ravishes of the Hessian fly which even at that time was a serious pest.

Likewise in those days there was little information available to direct the grower in the selection of varieties or strains of wheat which would yield best under his conditions. It was practically up to each individual farmer to make trials and tests of his own.

Again, contrary to what might be assumed, the maintenance of yields was a task for our earliest farmers from the outset. They were obliged to combat erosion; and the fact that rotation of crops and the return of plant food to the soil by manuring was insufficient to the securing of continued big yields soon became apparent. It was in large measure the lack of means such as we have today to increase productiveness of the soil that contributed to the migration of the farmers beyond the coast to the central virgin prairies of the Mississippi. To be sure Benjamin Franklin had noted benefits from application of land plaster to grass lands and the notes of George Washington reveal that he made a special trip to Pennsylvania to observe results with this fertilizer but in general only a very few individuals even attempted conservation of the land's resources. Yields of wheat in colonial days averaged about the same as today, namely about 15 bushels to the acre. From 20 to 25 bushels to the acre of wheat was considered very good in those times.

Did farmers in those days make money growing wheat? Undoubtedly some did and others didn't. The cost of production per bushel in labor was tremendously greater than it is at present. Most of the wheat in Washington's time was sown by hand although there were in use then some very crude seeding machines. One of the first seeders was a sort of revolving cylinder or barrel with holes burned into it to permit the grain to drop out as it revolved behind the plow. A brush harrow following served to cover the seed.

Likewise the labor toll of harvesting and threshing wheat was vastly greater than today. The wheat was cut with a scythe or cradle and the bundles bound by hand. The threshing was usually done with a flail. An idea of the human labor put into the threshing of wheat in the late eighteenth century can be gained by considering that on one of George Washington's farms he planned and erected a structure with a threshing floor capable of affording room for 30

UNDERWOOD AND UNDERWOOD

A giant combine harvester drawn by a team of 27 mules and horses harvesting wheat.

hands to work conveniently. Some progress had been begun as early as 1780 in the invention of crude threshing machines but no machine of this kind was as yet really practical. Washington is said to have tried out one of these machines but its production was all out of proportion to the repairs required to operate the equipment.

Practically all of the wheat grown by the early colonists was consumed locally. The value, therefore, of the crop was not dependent upon the world production as is the case now.

A century later when Missouri, Iowa, and Illinois were being developed wheat culture occupied an even more prominent place in agriculture. As early as 1870 about 20 per cent of the crop was exported and the farm price that year was about 94 cents per bushel, with average yields about 13 bushels to the acre. The reaper and rather crude threshing machinery had begun to materially reduce the labor expenditure of producing the crop and farmers generally seemed to be doing well. However, the majority of them were in debt by reason of the purchase and improvement of additional acreages to their holdings.

The Big Problem

THIS brings us to the present generation's experience in wheat growing and the story particularly of the last decade is fresh in our minds. Where do we go from here is the question of the moment. That with modern equipment farmers of the United States are capable of producing more than enough wheat for home consumption has been repeatedly demonstrated in late years. How much better than has been done in the way of production if the need arose and it paid to grow more wheat has as yet not been determined. We do know, however, that because of the nature of farming radical adjustments are rather difficult of abrupt accomplishment. However, an increase of 40 per cent in the production of wheat was accomplished in 1919 under special price and patriotic stimulus. It is reasonable to believe, therefore, that the feat could be repeated if it paid.

Since 1920 as everybody knows we have had a number of years when production of wheat has been somewhat in excess of domestic and foreign requirements. Such surplus crops depressed the price received by the producer in inverse ratio to the volume of the surplus. Under these conditions wheat growers particularly of the north and central west states have experienced some very lean years. They are consequently the ones most concerned about what the next and future crops will mean for them. Agricultural economists are not agreed as to how soon the requirements of our own and the world's growing population will take up the slack which naturally occurs in favorable growing seasons. However, the present annual increase in population of the United States is a not to be overlooked factor in solving our surplus production problems. There has been an increase of consuming population of 13,000,000 since 1920. This approximates about 2,000,000 more people each year that must be clothed and fed. In other words we are needing about 8 per cent more wheat each year to take care of the constantly growing domestic requirements. Few crops are as subject as wheat to weather conditions and it is thus a physical impossibility to adjust acreage to anticipated production with any degree of accuracy. In fact the present average acreage of wheat now sown is likely at any time to produce a seriously short crop. There is nothing on the horizon to indicate that new empires may be discovered where wheat can be more economically grown than in the present producing areas. Neither are there indications that the acreage in states and nations now growing wheat will be materially enlarged prior to the time that increased consumption demands encouragement of this step. It appears, therefore, that American wheat growers have seen conditions as bad as they are likely to be and since there is a way to make dollar wheat growing pay, the methods of those who are accomplishing this feat can well be more generally practiced.

Putting Profit in Wheat

PROFIT in any business is determined by the difference between cost of production and the sale price of the commodity. To the extent, therefore, that production costs are reduced in growing wheat, is profit to the grower amplified. In what ways can wheat be produced more economically? Let us consider some of the major items of expense in its culture.

It is not likely that land rents or land taxes will ever be less than they are today in a growing country like ours, so no saving is likely here. By the use of better and more power machinery some reduction in the cost of preparing land for planting and harvesting is possible, but these possible reductions will be most likely offset by the need of larger investments in fertilizer and manure in the future. However, the relatively small increased acre cost of applying fertilizer more generously will be insignificant in contrast to the tremendous returns from the expenditure.

In bigger yields per acre and larger gross crops per farmer, which it is possible to obtain, primarily rest the immediate and future possibility for bigger profits in winter wheat growing. That this is so has already been proven. Farmers of the State of Ohio for example have increased the average yield of wheat from 12.2 bushels per acre which was the 10-year average yield for the decade ending in 1860 to an average of 17 bushels to the acre for the decade ending in 1920. To a wider use of commercial plant foods is this accomplishment largely credited by Professor C. G. Williams of the state agricultural experiment station. The same authority states that even greater returns will be secured by farmers of the Buckeye State

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SOUTH CAROLINA

Above is shown a part of the campus of Clemson College, location of the South Carolina Experiment Station. Station offices are in the building at the left.

Director H. W. Barre.

By A. B. BRYAN
Editor, South Carolina Experiment Station

MUCH water has gone under the bridge during the 40 years since the General Assembly of South Carolina, in December, 1886, passed "an act to establish the South Carolina Agricultural Farms and Stations" which provided for the establishment of two experimental farms to be known as "the South Carolina Experimental Stations, the object of which shall be to determine the capacity of new plants for acclimation, the manurial value of fertilizers and compost, testing the purity and vitality of seeds, examining weeds, grasses and other plants, investigating the growth, requirements and comparative value of different crops, studying the economical production of milk and butter, and conducting such other tests, investigations, and experiments as may bear upon questions connected with either the science or the practice of agriculture."

In July, 1887, the state board of education established, as required by the Act, one station in the Piedmont at Spartanburg, and one in the "lower tier of counties" at Darlington, and set aside $10,000 from the privilege tax on fertilizers for the support of these farms.

That same year, 1887, the funds of the Hatch Act, for the support of experiment stations, became available from the United States Government and the General Assembly accepted the terms of the Hatch Act and vested its administration in the trustees of the University of South Carolina, with authority to establish an agricultural experiment station under the terms of the Hatch Act. The result was an organized research staff at the Univer-

Measuring twigs on a fertilizer experiment with peach trees.

sity of South Carolina in Columbia, and three farms, one each at Spartanburg, Darlington, and Columbia; the whole, supported by $15,000 annually from the Hatch fund, plus $5,000 from the State Department of Agriculture.

Birth of Agricultural College

MEANWHILE, Thomas G. Clemson, adopted son of South Carolina and son-in-law of the great South Carolina statesman, John C. Calhoun, had a dream. Mr. Clemson was for years a member, as Calhoun before him had been, of the Pendleton Farmers' Society, which lays good claim to being the oldest living farmers' society in the United States. Some of the leaders in the society, including Mr. Clemson, had discussed the need of a farmers' college, and when Mr. Clemson died in 1888 he willed to South Carolina, the Calhoun estate (previously purchased by him at public sale) to establish an agricultural and mechanical college. It is worthy of special note, in passing, that Clemson was the first man to hold the office of "Superintendent of Agricultural Affairs" in the Federal Patent Office and that in urging in his report the creation of a separate bureau for agriculture he might properly be called the father of the U. S. Department of Agriculture.

Accepting the Clemson bequest in December, 1889, the South Carolina Legislature established Clemson Agricultural and Mechanical College and specified that the South Carolina Experiment Station supported by the Hatch fund be established at Fort Hill (now Clemson College) as a part of the new college to be built under the Clemson bequest.

After its establishment as a branch of Clemson Agricultural College, the South Carolina Experiment Station was supported entirely by the Hatch fund until 1920, when the state legislature granted a request for $25,000 annually, which was increased in 1921 to $50,000, and to which was added in 1923, $25,00 for boll weevil control work. Of course, the Adams Act funds have been available from the Federal Government since 1906, and now further federal funds are available from the Purnell Act of 1926. The final result is sufficient funds to make possible a rather broad scope of research work for the benefit of South Carolina farmers.

Four Stations Serve State

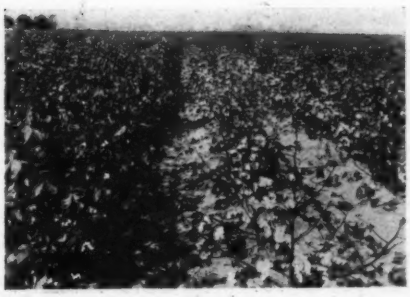
THE South Carolina Experiment Station is organized in accordance with the provisions of the General Assembly of the state and in line with the stations of other states. It is an integral department of the Clemson Agricultural College, its units being subject-matter divisions cooperating with one another, and the whole is in charge of a director of research,

who is responsible to the president and the board of trustees of the college. The division chiefs are of course specialists in their lines and are responsible to the director.

The work is conducted at four stations located on four important soil types of the state. The headquarters station is at Clemson College in the northwestern area and serves the Piedmont territory of hilly clay lands. The Pee Dee station, at Florence, is located on typical coastal plain loam soils of the eastern counties. The Coast station, at Summerville, is on flat cut-over land representative of the tier of counties along the Atlantic coast. The Sand Hills station, near Columbia, is on a light sandy soil found in a strip of counties running through the middle of the state near the "fall line" that separates Piedmont from coastal plains territory. The Pee Dee station was established in 1912-13. The Coast station was established in 1907, though some experimental work had been conducted on temporarily available land at Charleston since 1901. The Sand Hills station was established in 1927, jointly with the U. S. Department of Agriculture, and will therefore probably become one of the largest and most important research points in the Southeast.

The Pee Dee station has been since its establishment in charge of R. E. Currin as superintendent; the Coast station is now in charge of E. D. Kyzer; and the Sand Hills station is in charge of J. A. Riley,—all well trained and widely experienced agricultural workers.

A grape experiment.



Cotton breeding test.

Through the work at these four stations and through cooperative experiments on farms in various parts of the state, every important soil type and variety of climatic conditions is studied for the benefit of farmers and therefore the general public.

Directing Heads

WHILE the Station was a unit of the University in Columbia, the president of the university, Dr. J. M. McBryde, was officially the director, with Milton Whitney as vice-director in active charge. For some years following its removal in 1891 to Clemson College, the president of the college was designated as director while the active responsibility was vested in a vice-director. Prof. J. F. Duggar, now of the Alabama station, was acting director in 1891. Then came that grand old man of Southern agriculture, Col. J. S. Newman, who was in charge from 1892 to 1894 and again from 1898 to 1905. From 1894 to 1897 W. L. McGee was agriculturist in charge, and in 1897 W. J. Quick was vice-director. From 1905 to 1916 inclusive J. N. Harper was director. Since April, 1917, Prof. H. W. Barre, who since 1907 has been chief of the division of botany and bacteriology, has been the director.

Much good work of a fundamental character was begun and forwarded under Col. Newman and Prof. Harper; but greatest progress and most valu-

able scientific and practical results have been accomplished in the last 10 years under the careful planning and able management of Director Barre. A South Carolinian, trained at Clemson College and the University of Nebraska, Prof. Barre has to his credit 20 years of fine service to his native state and to the cause of scientific agriculture and is now a recognized authority and power for progressive farming. Quiet persistence, rigid thoroughness, and a rare good judgment and common sense are qualities that have helped him to use his technical training and his administrative position to telling effect.

The scope of this story prevents going into detailed history of the accomplishments of the South Carolina Experiment Station towards solving with science the problems of the art of farming, but below are given a few outstanding results and a brief statement of important problems solved or being solved through the patient and unsung labors of the staff of station workers.

Finding Fertilizer Facts

"YOU saved me $500 on fertilizers this year," said one farmer recently to Director Barre. The correct use of recommended formulas and materials explains this saving, and the case is illustrative of one of the most valuable lines of research conducted, for South Carolina farmers spend $25,000,000 or more for fertilizers each year. Ten or more important soil types and a great variety of crops each requiring its own fertilizer diet make the matter of kinds, amounts and methods of application of plant food a very important one.

Cotton has been King in Carolina for many decades, but even before Billy Boll Weevil, "the billion dollar bandit," appeared on the scene 10 years ago, there were other enemies that dealt King Cotton some severe blows; and these enemies the research army of the Experiment Station was constantly and succcessfully attacking.

A dozen years ago anthracnose, or boll rot, was a source of great loss in cotton fields of South Carolina,—millions of dollars annually, some fields suffering 40 to 50 per cent. Professor Barre, then chief of the division of botany and plant pathology, attacked this enemy from various angles, found that the fungus is transmitted in the seed, and worked out methods whereby through seed selection, fall plowing, rotation, and seed treatment the disease practically disappeared. Thus farmers of South Carolina and of other states were saved from immense annual losses.

Likewise with angular leaf spot, a widespread and wasteful bacterial disease, prevention and control measures were worked out by Rolfs and Faulwetter; and with cotton wilt, a destructive cotton disease, the remedy in this case being a new variety—Dixie Triumph (developed in cooperation with the Bureau of Plant Industry, by L. O. Watson) the wilt-resistant power of which makes it possible to grow cotton on thousands of acres of excellent loam lands otherwise lost to cotton production.

Whipping the Weevil

BY 1921-1922 cotton farmers of the Southeast were worried sick over the boll weevil, which took such heavy toll from cotton fields that farmers were playing a losing game. Attempts to fight the weevil directly by poisons had not been sufficient to bring back profits, and under leadership of Director Barre and President W. M. Riggs a legislative appropriation was secured and in cooperation with the U. S. Department of Agriculture the Boll Weevil Control Laboratory was organized as a separate unit to serve not only South Carolina but the southeastern states, as the Delta Boll Weevil Laboratory serves the Gulf states.

"Cotton production under boll weevil conditions" was the basis of

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City Farmers

Walter J. Toussaint and some of his boy pupils at work in the fine school garden at a New York Public School where children are taught practically everything there is to learn about growing flowers, garden truck, and field crops. It is all done in little patches. But one stalk of corn is enough to demonstrate to a youngster how corn grows.

These city school boys are not growing up to be truck gardeners. Some of them may be farmers. Some may be bank presidents, railroad executives, etc., with country estates where they can use their knowledge of plant life and soil.

The course also serves to teach botany in a very practical way. Toussaint has been in charge of the garden and the gardening classes for the last twelve years. He is an enthusiast, and his enthusiasm, plus unusual personal popularity, counts for much in the success of his work.

PHOTOS BY EWING GALLOWAY

The three rows of cabbage on the left received an application of 4-8-6 fertilizer at the rate of 500 pounds per acre. The balance of the field had previous heavy applications of manure.

Productive Swamps

By G. E. LANGDON
Wisconsin College of Agriculture

NEGLECTED swampy acres can be made as productive as upland soil, in most cases, if the farmer treats them with potash after supplying the proper drainage. The choice of the best crops for such land should be carefully considered.

"While part of our marsh land should not be developed under present conditions, there are, nevertheless, hundreds of thousands of acres which can easily be made into productive land," declared A. R. Albert, soil expert at the Wisconsin College of Agriculture. "This is true especially in the case of marshes forming a part of farms, the upland of which is already developed. In thousands of cases the development of the marshes will greatly improve the farm as a whole."

Where marsh soils are favorably located, they are well adapted to truck farming either as the main business or as a side line, but the farmer must study his crops and be prepared to invest in potash to succeed well.

Where wet acres form a part of upland farms, crops will be found which will supplement those grown on the upland part of the farm. The crops on the marsh for the most part should be produced by the help of commercial fertilizers, and manure should be used on the uplands.

What Crops?

WHAT can be grown on reclaimed marsh land is a question that the farmer must consider with care. Soil experts at Wisconsin have found that well drained marsh-border soils, mucks, and well drained and fairly well decomposed peats are adapted to a large variety of crops, although when marsh land is first placed under cultivation the number of crops that can be grown successfully is limited, especially if the soil is tough peat.

Soybeans, buckwheat, flax, timothy and alsike clover are commonly the

best first crops, although on mucks and well decomposed peats in southern Wisconsin, corn is very frequently planted as the first crop.

Corn and soybeans can be grown together for silage purposes, thus increasing the value of the feed. A light application of manure combined with a liberal dressing of phosphorus and potash fertilizers should be used to grow the best possible crop of corn on peat soils.

Rye will also do well and is frequently used as a nurse crop for grass and clover seeding.

In experimental work with rye, oats, clover, and corn at the Coddington, Wisconsin, marsh, it was found that 150 pounds of muriate of potash applied once in four years give about the same gross yields as are secured on plots receiving eight tons of manure. The addition of rock phosphate to the potash treatment has so far produced little increase. The total amount of phosphorus in this soil, however, is low, and it is only a question of time before phosphates will be needed as well as potash. When upland soils as well as peat are included in the farm, manure should be used on them and potash purchased for the peat, which does not need the nitrogen furnished by the manure.

In this experimental work the rate of application of potash was undoubtedly too small to permit maximum yields, since the amount applied did not equal the amount of potash removed by the crops grown. Taking the increases in the yields of these crops above those on plots not receiving treatment, and estimating costs, the increases due to 150 pounds of muriate of potash costing $3.75 would be worth $27.69. This makes the use of potash fertilizer on such soils very profitable.

Truck crops such as cabbage, onions and celery as well as potatoes and sugar beets may often be grown successfully on salvaged marsh soil.

Potash for Peat

LARGE applications of potash to peat soils planted in potatoes produced striking results at Coddington, Wisconsin, during 1926. Four hundred pounds of muriate of potash produced 312 bushels of Early Ohio potatoes per acre when half of the fertilizer was broadcast and half used in the rows. Before this time the average production was 150 bushels per acre for three years. When all of the fertilizer was broadcast, 400 pounds of muriate of potash produced a yield of 250 bushels per acre.

Potatoes need potash, according to C. J. Chapman of the Soils department, because the root system of potatoes is not very extensive and in order to make a vigorous growth there must be an abundance of plant food within the root feeding radius. The soil, of course, must be kept loose and friable,

A marked improvement in the third crop of rye on peat soil was still apparent from using 150 pounds of potash and 400 pounds of acid phosphate per acre, at Coddington, Wisconsin.

which necessitates thorough cultivation. Potatoes are heavy feeders on potash. A poor vine growth is frequently due to lack of nitrogen, other conditions being favorable, although the lack of potash manifests itself in a dark and rather crinkled condition of the foliage, and in later stages of growth, a bronzing of the leaves. Plenty of available potash results in a light-colored, thrifty, luxuriant growth.

Cabbage "heads" better if it has plenty of potash, although it also needs nitrogen. Unusually heavy yields of this crop have been secured in marsh land in Dane county, Wisconsin.

Onions can be successfully grown on muck soils providing the plant food content of the soil is maintained through the use of proper fertilizer and also that insect and disease pests are controlled. The advantage of using commercial fertilizer for onions is at once apparent since it is weed-free and easily distributed.

Soils experts at Wisconsin say that the kind and amount of fertilizer to use for onions will depend on the state of fertility of the land which is being used. In general the black sands and mucks are quite deficient in potash. Furthermore, onions, as well as other bulb and root crops, are naturally heavy feeders on potash, and for this reason fertilizer mixtures should contain relatively large amounts of potash. For peats and mucks the fertilizer should contain phosphoric acid and potash in a ratio of 1 to 1, or even 1 to 2, such as 0-12-12 or 0-10-20. It may be advisable to use a small amount of nitrogen as well.

Muriate of potash helped make this excellent crop of sweet clover on a marsh.

Sugar beets have been grown successfully on thoroughly drained mucks and on the well decomposed peats of southwestern Wisconsin.

"Where the sugar beet crop is grown on the muck or peat soils, it is necessary, of course, to use a fertilizer very high in its content of potash," explains A. R. Whitson of the Soils department. The ratio of phosphoric acid and potash should be 1 to 1 or 1 to 2, such as 0-12-12 or 0-10-20. It will be necessary to use larger amounts of commercial fertilizer, from 400 to 800 pounds of mixtures mentioned, on the peat or muck soils unless the soil has been manured or fertilized heavily for previous crops and is still high in its residual content of plant food. Where large amounts of fertilizer are applied on peat or muck soils, it should be applied broadcast and worked in deeply previous to seeding. In addition to the broadcast application, a small application of fertilizer containing some nitrogen applied with the fertilizer beet drill will be found desirable, since it will start the beets with a vigorous growth and will get the crop ahead of the weeds.

Marsh soils in general are not very well adapted to alfalfa unless they are well drained. Experiments indicate that alfalfa can be grown on well drained marshes, where the free water in the soil seldom gets higher than two feet below the surface. To insure best results under favorable drainage conditions, thorough fertilization and

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"A Broad Agricultural Field is Open to Chemists"—Dr. BROWNE

Dr. C. A. Browne, Acting Chief of the Bureau of Chemistry and Soils.

AGRICULTURE depends on the chemist for solution of some of its most difficult problems. Many of these problems were pointed out and discussed by Dr. C. A. Browne, recently appointed Acting Chief of the Bureau of Chemistry and Soils of the U. S. Department of Agriculture, in a talk to students of Columbia University. He said that the utilization of unmarketable and surplus products for new industrial uses is one of the most important of these problems and added that chemical utilization of plant and animal products is only in its infancy. At the same time he called attention to many new products and processes developed in recent years.

He spoke of present-day chemical utilization of the corn crop in the manufacture of starch, dextrin, glucose, sirup, dextrose, gluten, oil and many other things. One of the greatest accomplishments of the chemist in this field, he said, was the utilization of cottonseed oil as human food and in industrial processes. Dr. Browne believes that the results with these two crops are an indication of what we may expect in the handling of other crops in the future.

Products Demand Attention

AMONG the products whose manufacture demands much attention from the chemist are sugar, sirup, vinegar, butter, cheese, dried fruits, tobacco, leather, vegetables, oil, turpentine and many others.

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The crowd that came to study the plots in 1927.

Making Poor Land PAY

Solving problems of soil reclamation and fertility by experiments and demonstrations

By A. A. BURGER
Cedar Falls, Iowa

STRAWBERRY shortcake with plenty of good cream — all you want to eat! That in itself should be attractive enough to bring out any group of people. But this was only a halting point, so to speak, a part of a program for setting up a milestone at the end of the year; taking stock, as it were, of what had been accomplished; celebrating over the results.

A fertilizer plot.

On June 10th, more than 350 people—commercial club members and farmers—were called together to enjoy this repast, which was held at Cedar Falls in Black Hawk county, Iowa. These people met to celebrate an event—a soils demonstration of far greater influence and magnitude than those who started it a few years ago ever dreamed it might become. It was put on by the commercial club in cooperation with the farm bureau and the people. Dealing, as it did, with the problem of an abandoned soil, it was basic, touching the very fountain of prosperity for both the country and the town over a large area. This at once explains the interest in it.

The most important part of the celebration and field day was spent in the study of an experimental demonstration. In addition to this field day thousands of visits to these experimental plots have been made during every season of the year except winter by farmers, city men, high school students, extension workers, county agricultural agents, and college students, many of whom drove in from miles around.

The importance of the results of this experiment is increasing with the years. In themselves the results are not new. But the plan of the demonstration well could be followed by those whose leaderships have taken them into the field of agricultural edu-

cation. The experimental data should be of interest to those concerned with financial and social conditions, the results of crop and soils treatments, or, in general, the problems of soil reclamation and fertility.

Abandoned Land

IMMEDIATELY following the world war, the attention of the people of this particular territory in Iowa was focused upon a strip of some 2,000 acres of abandoned land—land once productive. Improper farming had robbed and impoverished the soil and the people on it. What could be grown profitably there, nobody knew; but to find this out, money was appropriated, the free use of 10 acres of land was secured, and 15 or 20 different crops were put in. This soil was gravel and sand, underlain with gravel. Those who are familiar with soils know its peculiar limitations. Likely it was at one time the old channel of the Cedar River. Forty years ago it raised good crops of clover, corn, and wheat.

What happened here in the short space of one generation is what is happening in a good many localities —everything was sold off the land, nothing was put back. The inevitable result was that the unprofitable day of farming, the zero point, had come. A soils project to start here must start with zero. The problem was first, to find out what would grow; second, what would grow profitably, third, what treatments were necessary and finally the fourth, and most important, whether the necessary work and expense of soil treatment would produce final results that would be profitable enough to make farming profitable. The experimenters were like mariners lost at sea without chart or compass. Time alone was with them.

On June 10, 1924, the work was launched. Business men were skeptical, farmers made fun of it, some folks thought it foolishly visionary. The first year things looked rather gloomy, but the committee in charge held. Some accounting to show cause for expenditure of funds was necessary, and so a public meeting was called for the last of July. The visitors saw that the vine crops—melons, cucumbers, etc.—were drying up. None of the regular crops of the section was succeeding, yet they were the regular crops that had always been depended on. Dalea, the new poor

An outstanding plot of the demonstration which finally convinced doubting neighbors.

land crop, was a fizzle. Cane and sudan did fairly well, responding best where manure or commercial fertilizer—a 3-12-4—was applied. Navy beans, soybeans and cowpeas did only fairly well, showing a pronounced effect when inoculated and responding to manure and commercial fertilizer.

But manure was the one product in which this entire section was lacking; there was no livestock, and manure had to be bought and hauled in for several miles. All this was a failure. It was very fine demonstration stuff for the Smith-Hughes students of the entire region, and for the agricultural students of the State Teachers college at Cedar Falls. It was a good lesson in the effects of land robbery.

Farmers from outside came in. Those near-by—well, nobody ever saw them in the plots. Strange, but they resented the state-wide advertising which their land got. They kicked, and knocked, but stayed conspicuously away. Others were attempting to show them how to farm! Yes, all of this business was a waste of time and money, high collared farming! These neighbors said so!

The second spring came. A part of the plots had been seeded to alfalfa, 15 to 18 pounds per acre, varieties of Turkestan or common western, Dakota No. 12, Cossack, and Grimm, seeded in strips four rods wide running east and west. Across these variety tests, running north and south, were the different soil treatments, in strips two rods wide. Thus the plots, two rods by four, contained eight square rods, one-twentieth of an acre. Two and one-half feet alleys were left between the plots. Suggestions for the different treatments were received from Warner, Churchill, Hauser, and Hughes of Ames.

Good Results

I QUOTE from the notes in the record:

"Common western, winterkilled; Dakota No. 12, good; Cossack, better; Grimm, best—the best stand, seems most hardy."

Since the notes were made, similar tests throughout the country have given similar results and have increased the demand for the hardy strains of alfalfa.

"*Plot* (1), manure 8 tons, without limestone; *plot* (5), 400 pounds of acid phosphate, no limestone; *plot* (9), no treatment — all three plots complete failures. Lime is a basic essential. *Plot* (2), three tons lime, first cutting 2,300 pounds of alfalfa per acre; *plot* (3), lime 6 tons, 2,370 pounds; *plot* (4), 6 tons lime plus 8 tons manure, 2,560 pounds. Manure is beneficial.

"Plots 6, 7, and 8 each received 6 tons of limestone per acre. No. 6, with 400 pounds of acid phosphate, yielded 3,250 pounds; No. 7, with 8

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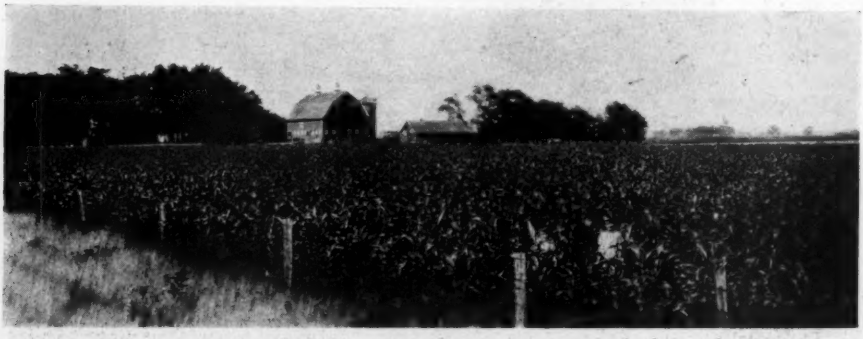
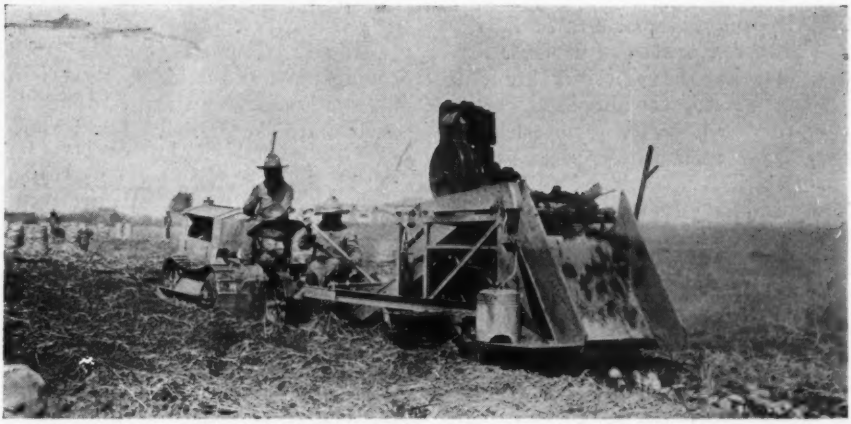


This fine field of corn followed alfalfa. Note the new barn in the background. This picture was made in 1927.



Specially designed potato digger equipped with an auxiliary engine, at work in the delta. This shows the digger without the sacking device.

Producing a Record Crop

By GUY A. PETERSON
Madison, Wisconsin

WHEN the world's record crop of potatoes was harvested on Zuckerman Brothers' farm in the Sacramento valley of California last fall, it marked a new epoch in potato culture because most of the work connected with the production of this yield of 62,293 pounds of fine quality spuds from a single acre had been done by power machinery. This yield in terms of bushels is 1,038.2 or almost 10 times as much as was harvested from the average acre devoted to the production of potatoes in the United States.

The potatoes were grown on the famous Henning tract in the Stockton Delta. It is the second world's record to be shattered in this region, for in 1924 F. H. Rindge, operating a delta tract not far from the Zuckerman ranch, grew 57,752 pounds or 962 bushels from one acre.

That the Zuckerman record is not a mere stroke of fortune is demonstrated by the fact that 6,624.5 sacks weighing 798,443 pounds were dug from a measured tract of 13.7 acres. This is an average of 972 bushels an acre or 10 bushels more than Rindge's world's record of three years ago. J. E. Curry, state potato inspector of California, superintended the digging and certified the accuracy of the figures.

No one can tell to what lengths man will go in the task of producing the world's food, but certain it is that proponents of the Malthusian theory will have to admit that the possible day when the population will overtake the food supply must lie in a remote future when such yields can be secured by scientific application of the principles of soil fertility.

Record Increases

IN 1916 the zenith of production was thought to have been reached when a Nevada grower dug 692 bushels of potatoes from an acre. A Maine gardener a few years later added more than five tons to this record yield by producing 866 bushels. He in turn was eclipsed by an English potato fancier who succeeded in cajoling 887

bushels from an equal area of land.

The three Zuckerman brothers Roscoe, Maurice, and Herbert are only getting started, for they feel certain that they will better their record as they learn more about the fertilizer characteristics of their soil and as new high producing strains of potatoes are developed. The average production for their 1,700 acres in potatoes last year was nearly 600 bushels an acre, making a grand total of more than a million bushels, nearly all of which were classified as U. S. No. 1 or better. Many of them went to feed the boys in our navy for the Zuckermans have a contract with Uncle Sam that calls for more high quality potatoes than many individual counties in this country produce.

Zuckerman Brothers own and operate 2,700 acres in this single tract. They had 1,000 acres in onions, beans, alfalfa, and sweet corn last year. More than 300 cars of onions alone were harvested.

Fertilizer Tests

IN cooperation with the College of Agriculture of the University of California, a series of fertilizer experiments are being made which, when completed, should be of great value to potato growers on muck and peat soils. We asked Herbert Zuckerman to give us the results of the study to date but he does not think it advisable to have these results published until more definite figures can be secured. In general, fertilizers carrying high potash and phosphate percentages are proving most profitable as these peat soils contain large quantities of nitrogen but are exceptionally low in potash.

F. H. Rindge used a ton of 0-21-21 fertilizer on his acre when he made the 962 bushel record in 1924 and the Zuckermans used a correspondingly large amount. The 13.7 acre plot that included their record acre was all in the experiment, so various amounts of different kinds of fertilizer were applied. The record acre received an application of one ton of an 0-23-24 mixture. It may be several years before the Zuckermans are sure enough of their findings to make the results of these trials public.

Herbert Zuckerman told us that they will spare no expense to find the most economical fertilizer practices for their type of soil, but he confesses to the gigantic task that lies ahead of them before this problem is solved. He criticizes the chemical approach to the science of soils fertility that is now used by many soil specialists on the grounds that it is inadequate. To quote him verbatim:

"Until we know what is going on in the plant and learn the place bacteria and catalytic agents play in the soil we cannot hope to solve the fertilizer problem from the purely business standpoint of getting the most economical returns from an applica-

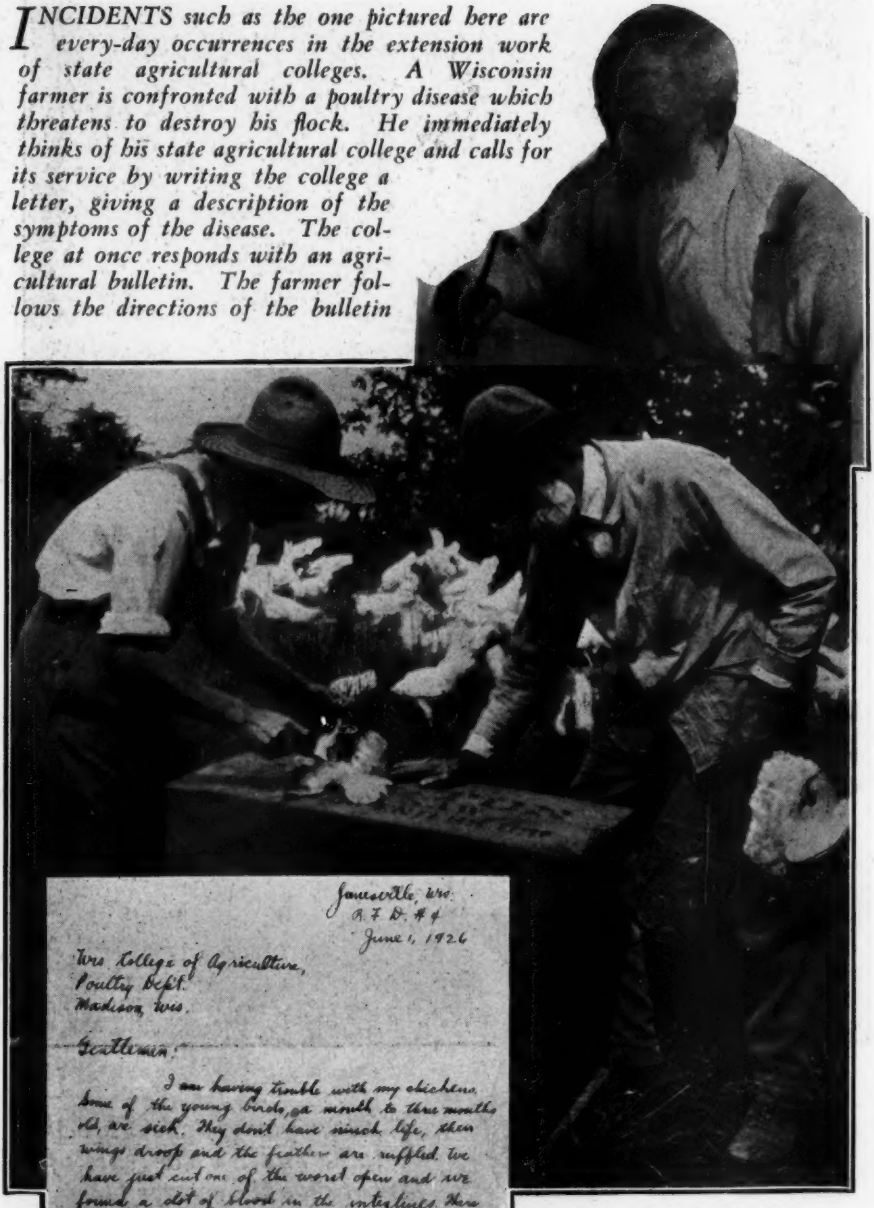
(*Turn to Page* 51)

World's champion yield of potatoes sacked and ready for the washing machines.

Pictorial

THIS youngster's broad smile and the contents of his hat give the rooster plenty to crow about. However, egg production is withal a serious business. Some of the things back of a hat full of eggs, a boy's smile and a rooster's crow are shown on the following two pages.

INCIDENTS such as the one pictured here are every-day occurrences in the extension work of state agricultural colleges. A Wisconsin farmer is confronted with a poultry disease which threatens to destroy his flock. He immediately thinks of his state agricultural college and calls for its service by writing the college a letter, giving a description of the symptoms of the disease. The college at once responds with an agricultural bulletin. The farmer follows the directions of the bulletin and the flock is saved.



Janesville, Wis.
R. 7 D. #4
June 1, 1926

Wis College of Agriculture,
Poultry Dept.
Madison, Wis.

Gentlemen:

I am having trouble with my chickens. Some of the young birds, a month to three months old, are sick. They don't have much life, their wings droop and the feathers are ruffled. We have just cut one of the worst open and we found a clot of blood in the intestines. There is also something like a blood pouch. The sick birds don't have much of an appetite and most of them are thin and lame.

I have lost about two dozen birds so far and a number more look as if they will die. This disease doesn't seem to affect the old birds.

If I don't get help before long, my flock will be wiped out. Please write and tell me what to do.

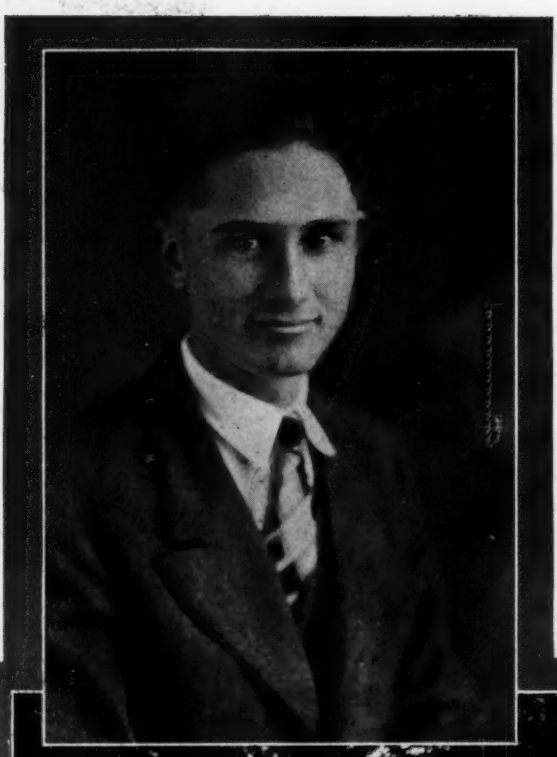
Very truly,
Marion A. Buck

In the photographs, which won first prize at an agricultural editors' convention, the farmer is shown examining an unfortunate member of his flock and afterwards writing his findings to the college. The bulletin room is shown receiving the letter

and mailing out the bulletin.

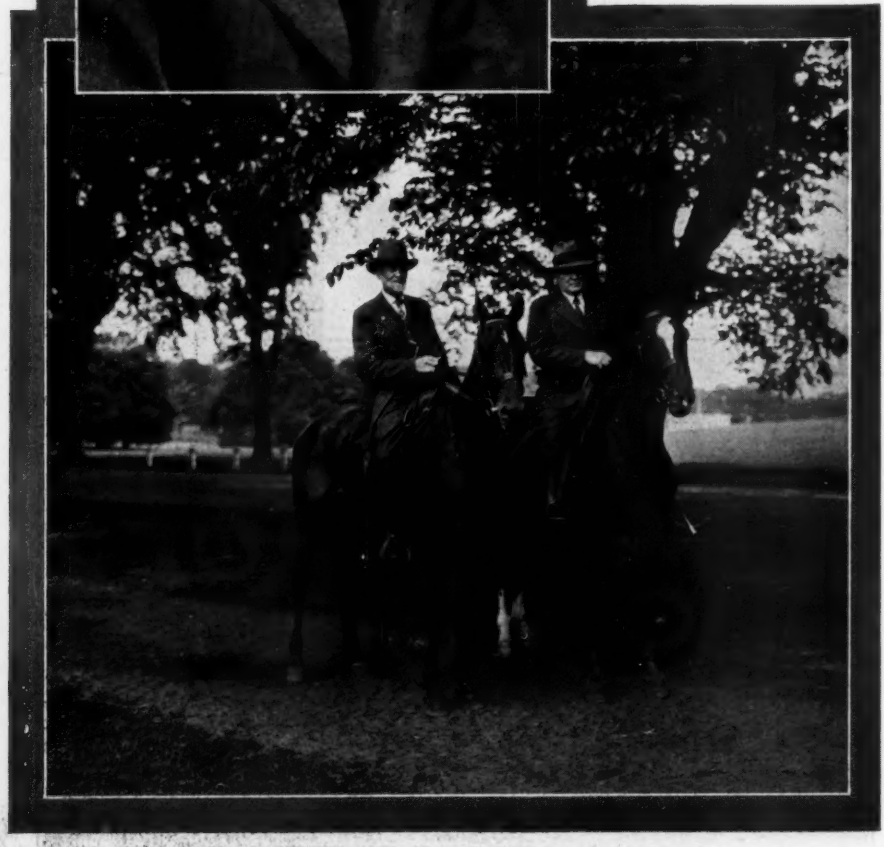
The farmer is shown receiving the bulletin, Coccidiosis, and is finally shown, reaping the benefit of his good judgment, with a basket full of eggs from his now healthy flock.

He is only one of thousands upon thousands of farmers who have received valuable aid from state agricultural colleges.



Left: Olin Butler, president of the Oakland 4H Club Federation, selected as one of the nine boys and girls to represent the state at the National Club Camp at Washington, D. C. He was president of the club that won the state championship in 1925-26.

Below: R. W. Dunlap, Assistant Secretary of Agriculture, and his father, a large landowner and farmer of Ohio. The elder although 84, is still very active and a good horseman. The photo was made near the Department of Agriculture in Washington.



Above: President and Mrs. Calvin Coolidge as they appeared with Superintendent O. R. Matthews of the Ardmore Field Station in the corn and oat fields of Ardmore, South Dakota, which were visited by the Presidential party recently.

Right: An Indiana farm boy and his pet.

Introducing one of the few and possibly the only pair of twin mules in the United States, owned by Clarence Campbell, a farmer residing near Washington Court House, Ohio. Twin mules are as rare as the proverbial "blue moon" and the owner has about decided to name one of them "Blue" and the other "Moon." The frisky little hybrids are normal, although one is much smaller than the other. They are pictured with their proud mother.

A scene in the sunny South of Spain where the most hygienic and efficient method of selling milk seems to be direct from goat to customer. Each goat knows its list of customers and it stops in front of their houses while the buyer comes out and takes its daily quantity of milk.

The Editors Talk

A Tribute to Science

"WE ARE sadly deficient in accurate scientific knowledge and this paper is a plea for an awakening in this respect. Fortunately for our own little circle of activity, we have evolved a method of production which is phenomenal in comparison with others in the same district and also when compared with the average of individual results in other parts of the United States or the world. But we have seen enough of the possibilities of the future to make us think that our present best performance without scientific measurement will be considered very poor when true science comes to aid us."

This statement by R. C. and H. G. Zuckerman, Stockton, California, before a recent meeting of the Potato Association of America opens a whole new field of speculation as to just what science can do for agriculture. Accorded fame as growers of the world's record yield of potatoes, 1,038 bushels on one acre of land, these two farmers still maintain that they are sadly in need of scientific knowledge.

What an argument for the county agent who is looking for a renewal of his contract! What good reasoning to present to a county board contemplating hiring an agricultural agent!

In this issue we are running a story about the farming activities of the Zuckerman Brothers, extraordinary farmers because they constantly carry with them a vision of what might be achieved in the way of crop production once science unlocks more of the secrets of plant growth.

These two men not only use all of the present available scientific knowledge practicable to their conditions, but they, themselves, are thinkers. They attended the recent International Congress of Soil Science held in Washington and intelligently discussed, with the leading soil scientists of the world, scientific problems of mutual interest. The scientists listened to these men who see possibilities of increasing in almost unbelievable measure the present average production of some of the staple crops, and also increasing profit in the marketing of these crops.

This tribute to science by men who, because of their achievement, have every right to a feeling of self reliance and independent endeavor, merits the attention of the whole agricultural industry. We need more expressions of this kind to stimulate and encourage the tedious and often criticized work of the agricultural research worker.

Better Agricultural Fairs

THERE is a justifiable pride in accomplishment. Whether that pride reaps the attention of onlookers depends largely upon the way in which the doer makes known his achievement. Little sympathy is accorded the man who ballyhoos his accomplishment. The world is full of "show-mes."

With this in mind the editors wish to endorse the efforts of fair managers, county agents, enterprising farmers, and others who are constantly working for more interesting county and state fairs—the "show-yous" of better agriculture and better rural living. We want to doff our hats to the executives who are excluding from their expositions the fakirs and cheap amusements which detract from an appreciation of work well done. Especially do we want to commend the managers of county and district fairs in a mid-western state who recently met in an exposition clinic to learn what, if anything, is wrong with the present day agricultural fair. They diagnosed its ills, actual or imagined, and then went back home to put into practice some of their findings.

This particular state's leadership in agricultural fairs, both county and district, is by no means an accident. Believing that these expositions serve a big purpose in developing the agriculture of the commonwealth, the legislative body of this state annually furnishes around $300,000 as state aid to the county-wide demonstrations and displays.

A leader in the movement for improvement of the classification of agricultural displays in that state firmly believes that the county fair should furnish common ground on which leaders of agriculture, industry, commerce, and education may meet for the purpose of doing those things that will result in better farms, better business — in short a better county.

He is convinced that from the view-point of the visitor, such fairs have a distinct function in that they should educate, inspire, entertain, and amuse. Each year a county fair should register a clearly defined milestone in county projects.

"In its colorful presentation and exhibit, demonstration and wholesome amusement, the county fair has made a distinct contribution to the cause of better farming," said another fair commissioner. "Its future will depend largely on whether or not the fair secretary definitely plans that his institution shall be a leader in the progress of his community."

A great many of our readers are already actively planning their exhibits for local or state fair this fall. More should become interested. There is a justifiable pride in accomplishment. Put a show case on some of the splendid work which you are doing.

It will sell your efforts and better agriculture as well as any other one thing.

Give Russia Credit

ACCORDING to the authority of Dr. C. F. Marbut of the United States Department of Agriculture, Russian scientists have developed "the first and only comprehensive theory of soil genesis, aside from that of the genesis of soil material, that has yet been worked out." Thus has Russia contributed to the solution of some of the problems pertaining to the soil.

There are two chief reasons for this:

1st — The tremendous geographic extent of Russia which stretches over a large part of the greatest continuous land area of the globe, and

2nd — The presence in that country of the great belt of strikingly characteristic black soils.

The Russians are able to study the characteristics of soils within their own country in regions of widely different climatic, geologic, topographic, and biologic conditions. The opportunity provided by these widely varying natural conditions has been a great stimulus to soil investigations in that country.

Only in the United States is this natural variety of conditions duplicated to anything like the same extent.

Therefore, as pointed out by Dr. Marbut, the fact that the soils of our country are so much like those found in Russia makes the results of Russian soil investigation particularly interesting to American investigators.

The land area of the greatest interest to Russians is the belt of black soils, or in Russian, "Tschernosem." This interest has been aroused because of the great agricultural importance of this black soil, its large area and the conditions under which it occurs. All sorts of travelers and scientific people have endeavored at various times to answer questions regarding the origin of this typical black soil, why it is confined to a particular region, and how the great amount of organic matter in the soil originated.

Therefore, while we have always looked to Germany, England, and France for new ideas and a stimulus of thought regarding soils, we must now add to our list the contributions of the soil scientists of Russia, and particularly should we follow the work of the Dean of all Russian soil scientists, Professor Dr. K. D. Glinka, Director of the Agricultural Institute, Leningrad.

Branches that bore the previous year are pruned leaving only one branch which is cut short.

The Cultivation of Grapes in Champagne, France

GRAPE culture is followed in some sections of France with a diligent care that is akin to love, especially is this true in the western part of the province of Champagne. The work is often done by peasant proprietors who have a proud attachment to their vineyards that lasts from father to son, sometimes for centuries. While the eastern part of the province is very dry and poor and grows hardly enough grass to raise a few sheep, the western part is one of the richest sections of France. It is constituted by the lower valley of the river Marne. To the north and the south of the river are gentle slopes. The crests of the hills are covered with woods while the properly exposed slopes are planted in vines.

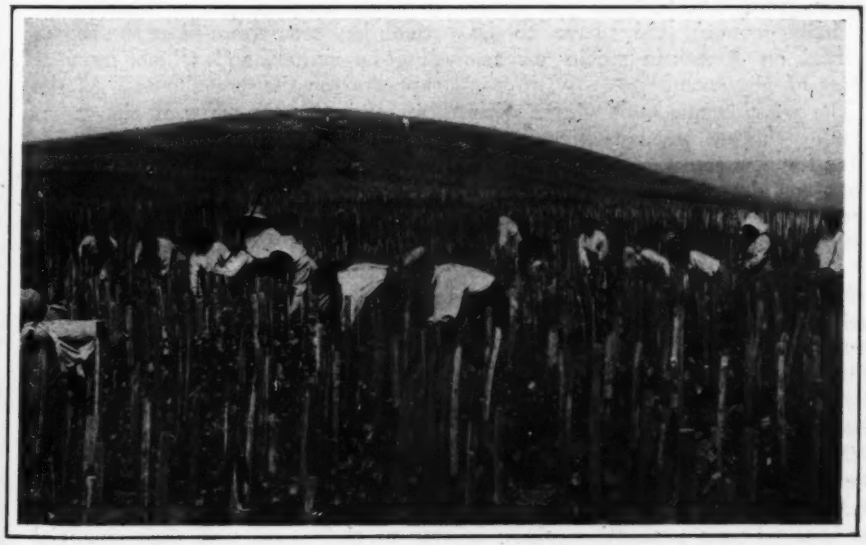
The centers of the vine-growing sections and of the Champagne wine industry are the towns of Rheims and Epernay. The value of the land planted in vines is very high, probably higher than any other agricultural land in France. Last year, the average value of an acre of vines near Epernay was about Frs. 40,000, or nearly $2,000 at the present rate of exchange, representing $8,000 at the pre-war value of the franc. The cost of cultivating an acre of vines is about Frs. 6,000 or $250 at the present value of

Pruning is followed by digging in; each vine plant is buried, only the shortened branch left by the pruner is allowed to emerge from the soil.

the franc, ($1,200 at the pre-war value of the franc).

The amount of labor invested in the cultivation of an acre of vines in that section is very high, only it is more than mere work, it is a labor of love. The slightest change in the cultural methods would alter the quality of the wine and the growers, anxious to live up to the reputation of the wine they produce, will do anything and go to any expense to maintain quality.

A few years are required to prepare the ground, plant the vines and bring



After digging in comes the placing of wooden props which serve as supports for the new shoots. The shoots are tied to the props with straw.

When grapes are ready to be picked men, women, and children join in the harvest.

these vines to the point where they will yield crops of the high quality necessary to make Champagne wine. If properly taken care of, the vines will live and bear for many years. It may be remarked that Champagne is one of the few sections of France where vines can be grafted on native stocks, giving a better quality of wine. In most sections, they have to be grafted on American stocks on account of phylloxera.

The work begins each winter with pruning the old wood to prepare the plant for new sprouts. Formerly, this work was done entirely by men, but since the war, pruning is very often taken care of by women laborers. Most of the branches that bore grapes the previous year are cut, one only is left and it is cut to three or four buds. Pruning is very important, because Champagne is at the northern limit of the region where grape production is possible, and in order to obtain grapes rich enough in sugar to be suitable for the manufacture of wine, only a very small number can be left on each vine. In spite of this precaution, there is hardly more than one crop in four or five years considered by the wine growers as of very good quality.

The vines are heavily fertilized and given an unusually large dressing of potash. Pruning is followed by digging in; each vine plant is buried, only the shortened branch, which has been left by the pruner, being allowed to emerge from the soil. After digging in comes the placing of wooden props, which had been removed at the beginning of winter, and which serve as supports for the new shoots. As the vine grows, the surface of the soil is hoed over slightly, and the shoots are tied to the props with straw. Finally the shoots are cut to a height of about three feet.

Harvesting the crop is very hard work and requires much skill on the part of the harvesters, because only properly matured grapes can be picked. The grapes from one vine will be harvested in five, six, seven or eight times. Only the grapes are picked, because if the stems and wood of the bunch were pressed with the grapes, it would produce a very inferior quality wine.

The care devoted by the vine growers to their work and their financial expenses have been recognized by the

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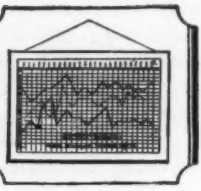
AGRICULTURAL DEVELOPMENTS



By P. M. FARMER

Forest Soil Science

The recent Mississippi Valley flood, the worst in the history of the Father of Waters, has stimulated renewed interest in soil and forestry problems. Now comes Dr. Raphael Zon, head of the Lake States Forest Experiment Station at St. Paul, Minnesota, with the suggestion that we need a science of forest soils as a division of general soil science. Dr. Zon says: Our knowledge of both the influence of soils on different types of forest and the influence of different types of forest upon the soil is largely of an empirical nature. It is only by the development of a forest soil science that a truly scientific foundation for forest practice can be developed. The conservation of the fertility of the soil is just as fundamentally important to forestry as it is to agriculture; nay, it is even more important in forestry than in agriculture. The agronomist has a great variety of artificial means for increasing the fertility of soils. He mechanically cultivates the soil; he increases its fertility by fertilizers or crop rotation; he protects it from drought by special methods of cultivation. The forester can not, as a general rule, resort to such artificial means of working his soil. For maintaining the soils fertility he is thrown back on the resources which nature provided. The forester must make the forest itself conserve not only the fertility of the soil but even improve it. He does it by maintaining a certain density of stems; by regulating the density of the crop; by creating an undergrowth; by controlling the composition and the form of the forest. The mechanical tilling of the soil he assigns to the roots of the trees and the fauna of the soil. The fertilizing of the soil is assumed by the trees in the stand. . . . The relation between the forest and the soil is closer and deeper in forestry than in agriculture.

Radio in the Cow Barn

Despite a lot of talk about the beneficial effect of music on the productive capacity of the dairy cow, it has not been proved that musical instruments are necessary modern dairy equipment. But J. F. Couture, a dairyman of Marshall, Minnesota, has approached the problem from a different angle. He has installed a loud speaker in his dairy barn, the object being not contented cows but contented hired men. About milking time in the evening there are usually good programs coming in. Only once has the radio interfered with the business of milking. That was during the Dempsey-Tunney fight and the loud speaker in the barn was not working well. Mr. Couture and all the other milkers adjourned to the house where there was better equipment.

European Grapes in Carolina Sandhills

A successful new crop for the North Carolina sandhills region is European grapes. They have also been found to grow well in the same kind of soils in South Carolina. They are said by the horticultural specialist of North Carolina to do even better than these varieties do in California, which State now has a monopoly of this kind of grape growing in the United States. In this sandhill region the new grapes, both juice and table varieties, are not

only vigorous and productive, but are to a large extent free of disease and insects. Economic advantages here are cheap lands and nearness to big markets in the East and South.

Fitting Crops to Certain Soils

Recently the writer of this department read an editorial in a city newspaper to the effect that soil survey work was useless, that no farmer ever made any practical application of the information, and that very few other people paid any attention to it. Almost immediately thereafter there came to his notice a statement by the chief of the agronomy department of North Carolina State College in which he says that "nearly every agricultural soil type in North Carolina has certain characteristics or aspects which make it better suited to a certain crop or certain kinds of farming than to some other crops or types of farming. There is tobacco for instance, and red clover. We know that best results with tobacco are secured when a crop is grown on certain Norfolk, Durham, Alamance, Granville, and Cecil soils. When the crop is put on other soils the quality is not so good and the tobacco does not grow so well. Red clover does best on the Davidson clay loam soil." This agronomist adds that a sound plan of promoting the growth of special crops may be worked out if such facts are followed. He says this is especially true of alfalfa, red clover, or tobacco. When such information is available it is obvious that a knowledge of soil types is worth having.

The Smithy's Successor

The chestnut tree is disappearing and so, it seems, is the smithy. In many sections farmers now find difficulty in getting their horses shod because the local blacksmith, his trade cut down by the revolution in the means of transportation, has turned his horny hand to other work. With his automobile the farmer finds it convenient to take his repair work to the city, but distance is a barrier to the horse needing a new set of shoes. One of the best plans to solve the difficulty occasioned by the smithy's disappearance is one now in use in New York State. It consists simply in teaching farmers and their sons to do this important job themselves. Meetings are arranged by the county agents and an expert farrier in the employ of the College of Agriculture gives an illustrated lecture and puts on a demonstration. If there are horseshoers and blacksmiths in the community they are also invited to attend. Attention is given to the anatomy of the foot and leg, preparation of the foot for the shoe, and the actual shoeing.

Cream May Be Fat and Thin

Thick-headed persons will probably persist in the belief that the thickness of cream is an index of the percentage of butterfat it contains, while those with their fat properly placed will accept the conclusions of dairy specialists who now say that thick cream can be produced regardless of the amount of fat it contains. It is announced by the New York State Agricultural Experiment Station that the thickness can be regulated by controlling the clumping of the fat globules. However, the amount of fat, the age and temperature are also factors.

One way to influence the clumping of the globules is to hold the milk at a low temperature for several hours and then separate the cream at higher temperatures, but it is not thought the method will be of any commercial value in producing sweet cream. Pasteurizing, it is said, causes the clusters of fat globules to separate and causes the cream to appear thinner although it is just as rich in fat. Obviously it is not possible to judge the fat content of cream by its appearance.

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Soils, Fertilizers, Economics, Crops, Crop Diseases, and Insects. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

The Journal of the American Society of Agronomy for June, 1927, gives the papers on potash read before the last annual meeting of the American Society of Agronomy.

The first paper by J. N. Harper on the potash needs of the soil provinces shows in an interesting manner the soil types within the soil provinces that require potash. An interesting correlation of the principal soil types in the order of their needs for potash is given in a table. It is also pointed out that the soils of Eastern United States are poorer each year to the extent of 2,000,000 tons of available potash.

"Relative Crop Response to Potash" was discussed by Burt L. Hartwell. The paper is very interesting. It particularly points out among other things that a committee of New England agronomists has suggested that in fertilizers the proportions of the fertilizer ingredients be represented by certain given numbers, the sum of which shall be about 20 in each fertilizer, and that such an expression be known as a fertilizer ratio. The numbers recommended for potash were: very low, 2; low, 4; medium, 6; high, 8 and very high, 10, the point being that a wide range of percentages of potash should be available. Among the high potash-response crops cited by the author are tomatoes, mangels, buckwheat, corn, and onions. The medium potash-response crops are barley, rutabagas, parsnips, potatoes, and cabbages. The low potash-response crops are oats, rye, wheat, millet, and carrots.

Certainly a higher percentage and a wider range of potash is required in fertilizer recommendations made in many parts of the country.

A very interesting paper on "The Influence of Liming on the Availability of Soil Potash" by W. H. MacIntire, W. M. Shaw and K. B. Sanders should be studied in the Journal.

Professor Schuster discussed "Potash in Relation to Quality of Crop". He points out that potash is an important element in producing quality in potatoes, sugar crops, corn, wheat, tobacco, and sugar beets, but the evidence is not always clear as to just what form of potash produces the most desirable quality in every case. There is, therefore, need of well-defined investigations regarding the form of potash.

Every farmer in Missouri using fertilizers on his wheat or other crops should obtain Bulletin No. 251 published by the College of Agriculture on the fertilizers for soils in Missouri in 1926. We cannot repeat too often that it is always profitable to read carefully these reports and especially the simple instructions given on estimating fertilizer values.

Extension Bulletin No. 112, April, 1927, by the Connecticut Agricultural College Extension Service discusses the phosphorus problem on Connecticut soils. It shows that phosphorus is needed on many of the soils of the state, but that corn, grass, and hay crops when well manured, need only moderate amounts of phosphorus, also that such crops in a dairy sys-

tem have not seriously exhausted the phosphorus supply and that past heavy applications of phosphorus to older tobacco soils have resulted in a great accumulation of both total and available phosphorus. The figures are very striking. For instance, in new land the phosphorus content in pounds per acre is 1,528 lbs.; in land that has been 5 to 20 years in tobacco, 2,655 lbs.; but when 20 or more years in tobacco, the phosphorus content is 3,855 lbs. per acre.

"Potash in Relation to Quality of Crop," Reprinted from the Journal of the American Society of Agronomy, Vol. 19, No. 6, June, 1927, G. L. Schuster.

"Analyses of Commercial Fertilizers and Ground Bone; Analyses of Agricultural Lime, 1926." Agr. Exp. Sta., New Brunswick, N. J., Bul. 444, Dec. 1926.

"Fertilizer Statistics for Texas," Agr. Exp. Sta., College Station, Texas, Bul. 350, Apr. 1927, G. S. Fraps.

"Relation of the Potash Removed by Crops to the Active, Total, Acid-Soluble, and Acid-Insoluble Potash of the Soil," Agr. Exp. Sta., College Station, Texas, Bul. 355, May, 1927, G. S. Fraps.

Soils

"Aluminum Hydroxide in Alakaline Soils and its Effect upon Permeability," Agr. Exp. Station, Tucson, Ariz., Tech. Bul. 12, Dec. 1, 1926, W. T. McGeorge, J. F. Breazeale, and P. S. Burgess.

"Sodium Hydroxide Rather than Sodium Carbonate the Source of Alkalinity in Black Alkali Soils," Agr. Exp. Sta., Tucson, Ariz., Tech. Bul. 13, Dec. 15, 1926, J. F. Breazeale and W. T. McGeorge.

"A Study of the Toxicity of Salines that Occur in Black Alkali Soils," Agr. Exp. Sta., Tucson, Ariz., Tech. Bul. 14, Feb. 1, 1927, J. F. Breazeale.

"Crotalaria as a Soil Builder," Agr. Exp. Sta., Gainesville, Fla., Press Bul. 398, May, 1927, W. E. Stokes and U. A. Leukel.

"Soils of Phillips County," Agr. Exp. Sta., Bozeman, Mont., Bul. 199, Dec. 1926, L. F. Gieseker.

"The Recovery of Soil Nitrogen under Various Conditions as Measured by Lysimeters of Different Depths," Agr. Exp. Sta., Knoxville, Tenn., Bul. 138, June, 1927.

Crops

Fifteen crop bulletins have been received during the month. From California comes an excellent treatise on cauliflower production, Cir. 11, written by H. A. Jones and F. H. Ernst. Cauliflower is not an easy crop to produce. Yet it is one of the most popular vegetables served in our American restaurants and homes. The bulletin points out that most of the cauliflower grown for shipment is produced in California, New York, Oregon, and Colorado. Therefore, this well illustrated and well written circular should prove a valued addition to the working library of truck growers in these states.

Sweet potato growing, U. S. D. A. Farmers' Bul. 999, written by Fred E. Miller, is another contribution of the month to growers of quality vegetables. Put up in the characteristic and attractive style of Federal Government publications, this bulletin treats fully every phase of growing this crop, from a general discussion of its importance to problems of grading, marketing, and desirable varieties.

In particular regard to fertilization, the author states that every grower should make a study of his soil requirements and should apply those fertilizers that give the best results. In the Northern commercial sections where the sweet potato is grown as a truck crop and has a comparatively brief growing season, the crop must mature in the shortest possible period. In these sections, a heavy application of a high grade fertilizer is practicable. A fertilizer analyzing 2 to 4 per cent of nitrogen, 8 per cent phosphoric acid, and an available 8 to 10 per cent potash should give good results. The author also gives his fertilizer recommendations for growing the crop on the sandy loam soil of the South.

"Poisonous Plants of Colorado," Exp. Sta., Fort Collins, Colo., Bul. 316, Mch. 1927, L. W. Burwell and Geo. H. Glover.

"Growing Annual Flowering Plants," Agr. Exp. Sta., Gainesville, Fla., Press Bul. 399, June, 1927, W. L. Floyd.

"The Relation of Internal Cob Discoloration to Yield in Corn—Five Years' Results," Agr. Exp. Sta., College Park, Md., Bul. 290, Mch. 1927, R. A. Jehle, F. W. Oldenburg, and C. E. Temple.

Quarterly Bulletin, Agr. Exp. Sta., East Lansing, Mich., Vol. 9, No. 4, May, 1927.

*"Flax-Wheat Mixtures under Irrigation,"

Agr. Exp. Sta., Bozeman, Mont., Bul. 202, Feb. 1927, Clyde McKee.

"Mazzard and Mahaleb Rootstocks for Cherries," Agr. Exp. Sta., Geneva, N. Y., Bul. 544, Mch. 1927, G. H. Howe.

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"Prices of Farm Products Received by Producers," U.S.D.A., Washington, D. C., Statistical Bul. 15, May, 1927, Prepared by Bureau of Agricultural Economics.

"Reliability and Adequacy of Farm-Price Data," U.S.D.A., Washington, D. C., Dept. Bul. 1480, Mch. 1927.

Diseases

An important study on the "Mosaic of Raspberries" has just been published by the New York State Experiment Station, Geneva, N. Y., Bul. 553. W. Howard Rankin, the author, in the abstract of the bulletin states that mosaic is the limiting factor which has caused the general abandonment of red raspberry culture in New York. This is probably true in sections where the red raspberry used to play an important part in the large cash returns from bush fruits. Red raspberries are always in demand upon the market. Therefore, Mr. Rankin's work should be very valuable in throwing light on the situation.

Insects

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"Codling Moth in the Grand Valley of Colorado, Exp. Sta., Fort Collins, Colo., Bul. 322, May, 1927, Geo M.. List and Wm. P. Yetter, Jr.

"Preparation of Bordeaux Mixture," Agr. Exp. Sta., Gainesville, Fla., Press Bul. 400, June, 1927, G. F. Weber.

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"Montana Insect Pests for 1925 and 1926," Agr. Exp. Sta., Bozeman, Mont., Bul. 200, Ja. 1927, R. A. Cooley.

"Physical Properties of Commercial Dusting and Spraying Materials," Agr. Exp. Sta., Geneva, N. Y., Tech. Bul. 125, Apr. 1927, Leon R. Streeter.

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Poison Alfalfa Weevil

In several States of the Great Basin the alfalfa weevil has become a great factor in the production of this crop, sometimes getting half the first cutting and most of the second. It has gradually become more destructive since it was first discovered near Salt Lake City about twenty-five years ago. Various control measures have been tried, including quarantines, foreign parasites, and more direct methods. The best method, says the U. S. Department of Agriculture, is to spray with calcium arsenate several days before the feeding of the larvae reaches its height. This requires experience and close watching of the field.

Cooperative Shipping

The Farm Bureau of Columbia County, Washington, helps its members to market livestock

By WAYNE BISHOP
Dayton, Washington

WITH the sharp hi-yippi-yip-yip of the disappearing cowboy, farmers of Columbia county, Washington, drive their four or five head of cattle up the loading chute to the stock car and then go home to dream of the check they will soon receive with the same margin of profit as if they had shipped a whole carload.

The time has passed in Columbia county when a farmer with a few head of hogs, cattle, or sheep had to drive them to the local butcher and take whatever was offered, or hold them until he could handle them, which was probably after the price had dropped a couple of cents. The time has also passed when one riding through the country could see it stocked with poor and worthless stock, which the local butcher could not handle.

By Telephone

WHEN a farmer has stock to sell now, he telephones to the Farm Bureau secretary and tells him what he has. The secretary has also received similar information from other farmers, and when enough are listed to make up a carload or two, which is about every two weeks or oftener, he ships them out. All the farmer has to do is to bring his stock to the stock-yards at the time which the secretary has set for the shipment, and then come to the office the following week for his check, which has been sent there.

The county which has a population of probably 600 farmers has shipped to the Portland market a surplus of 921 hogs, 181 calves, 239 heavy cattle, and 454 sheep, or 22 cars during the last 11 months.

Variety of Tasks

READING thus far, you probably wonder who is behind this work—who does the actual shipping and how is it accomplished? The service is furnished by the Columbia County Farm Bureau, a farmer's organization, whose creed, motto, and aim are SERVICE. The work is done by the Farm Bureau secretary, who, since there is no county agent in Columbia County, has a variety of tasks.

His first task, in getting up a shipment, is to sign up enough stock from the farmers to get up a good carload with good weight, in order to keep the expenses down, since the shipping expenses are prorated on the basis of the weight. At the same time he must be doubly careful not to sign up more than a car will hold, unless, of course he has enough for two. Planning a carload in which sheep, hogs, and cattle are shipped is probably the most difficult part of the job. Of course he must know the approximate weight of the stock sent and then proportion his load accordingly.

On the day he has set to ship, he must be at the stock-yards to receive and brand the stock, in order that the commission company selling the stock may know to whom to make out the checks. Cattle and hogs are usually branded by clipping a brand with mule clippers, a chart of brand-

ing marks being furnished by the commission company. Sheep are usually branded by a special paint which will not damage the wool. As stock is branded it is listed under the owner's name, in order that the identification record may be sent with the car.

Sheep, hogs, calves, and heavy cattle, when sent in the same car must be partitioned off from each other, so partitions of suitable strength must be constructed during the day. The last task is the loading, with which some of the farmers usually help the secretary.

One of the shippers, or some Farm Bureau member usually goes with the stock to Portland, his expenses being paid out of the shipping expenses prorated to members, unless two cars are sent, in which case the railway company furnishes his transportation.

The stock is sold by a commission company to which the car is sent. The company also prorates the expense which consists of selling commission, feed, freight, etc., among the members according to the weight of their stock; subtracts it from their gross sales; and sends the checks to the Farm Bureau. They are made out in the shippers' names and all the secretary has to do is to distribute them.

Several of the direct advantages derived from this cooperative shipping have already been mentioned, although there are indirect ones that are overlooked by many who can plainly see the others. For instance, local butchers are offering several dollars more per hundredweight for stock than they offered before the farmers started shipping. At that time the butchers could take what they wanted when they wanted it. Now they have to bid up to a reasonable price for material for the block, and the farmer can do just as he pleases about selling it at home or in the Portland market.

This changed condition has brought up the standard of livestock in the county in a similar way. Old and undesirable animals that the local butcher could not possibly use, are shipped to Portland where they sell as canners and cutters at fair prices which is just like finding that much money for the shipper. It is surprising to note the amount of this aged and scrubby stock that has been shipped out of the country.

A vast fund of information has been opened for the farmers through this channel. They are taking more interest in the type of stock that brings the highest price in the large markets, and are taking steps to produce that type. The $35,000 or $40,000 which cooperative shipping has brought the farmers directly, represents only a fraction of its value.

Wasted Milk

IN speaking before the Minnesota creamery operators and managers association recently, Dr. C. W. Larson, Chief of the Bureau of Dairy Industry of the Department of Agriculture, after commending the state for the great progress made in the manufacture of butter, called attention to the great waste of milk solids in butter producing sections. He said, "It is a startling waste to use 25 per cent of the milk solids and disregard the other 75 per cent. In the manufacture of butter there are more of the constituents of milk either wasted or not utilized than in the making of any other dairy product. Of course, there are not now ways of using all of this in a better way than through the feeding of livestock, but before long it will be necessary to use much more of the solids and the skim-milk directly as feed or dispose of them to better advantage such as in the manufacture of greater quantities of skim-milk solids and buttermilk solids.

"A Broad Agricultural Field Is Open to Chemists"

(*From Page 25*)

"The reduction of enormous losses which occur each year from the spoilage of fruits, vegetables, foods, cattle feed, fabrics, timber and other products," said the Chief Chemist, "can be brought about to a large extent by the scientists assigned to this work."

He said that bacteria, molds, yeasts and fungi, enzymes and insects caused the American farmer a loss of several billions of dollars every year and that the chemist is the main reliance in controlling these loss producers. In connection with these enemies of the producer he mentioned souring of milk, molding of bread, spoilage of canned goods, heating of cattle feeds, rotting of fruits, fermenting of sirups, and decay of timber. Many processes of deterioration, he said, are imperfectly understood and consequently furnish a wealth of opportunity for the research man.

Soils and Fertilizers

DR. BROWNE called attention to work that has been done in the study of the chemistry of soils and fertilizers and indicated that the population increases and the necessity for more intensive cultivation of the land call for greater attention to the chemistry of soils and fertilizer.

In showing the possibilities for utilizing farm wastes, Dr. Browne said that opportunities in this field are almost unlimited, for much remains to be done in chemical utilization of agricultural residues. Thousands of tons of straw, corn stalks and similar refuse are wastefully burned each year for the purpose of disposal. Destructive distillation of such refuse for the production of gas, carbon, pyroligneous acid, tar and other products opens up vast possibilities. Chemical utilization of the cellulose in agricultural wastes, such as straw, is already carried out in certain paper mills. Conversion of the pentosans of such materials as corn cobs and oat hulls into the valuable chemical furfural is being performed on a small scale. The important lignin complex in waste wood, straw, corn stalks and similar agricultural refuse probably offers as many methods of utilization for the manufacture of tanning materials, dye-stuffs, and other industrial products as was offered 80 years ago by that other trade waste—coal tar—which through the ingenuity of the chemist has proved to be an almost inexhaustible source of wealth.

Productive Swamps

(*From Page 24*)

cultivation are necessary. Before seeding, 75 to 100 pounds of muriate of potash and 200 pounds of acid phophate per acre should be applied to furnish available potassium and phosphorus.

The alfalfa crop offers one of the best weapons against Canada thistles. The stand must be thick and liberal applications of potash are important.

The Cultivation of Grapes in Champagne, France

(*From Page 42*)

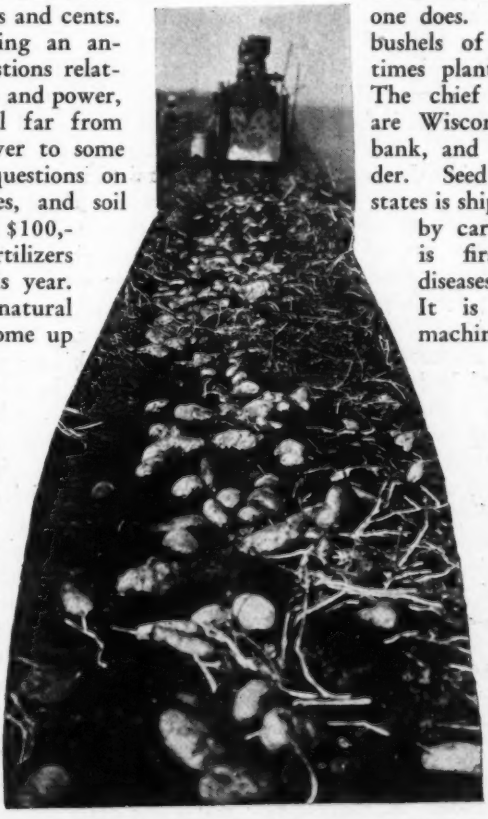
French Law; no wine can be called "Champagne" unless it has been made according to certain rules with grapes grown in a section around Rheims and Epernay very strictly outlined by the law. Thus the growers are assured that their pains will be rewarded, the buyers being ready to pay the necessary price when they are sure to find exceptional quality in what they buy.

Producing a Record Crop

(*From Page* 30)

tion. Thousands of experiments are being made to illuminate variable factors but such studies as what is happening in the soil and the nutrition of growing things get little attention. In the operation of our 2,700 acre farm we aim to do everything in the most efficient manner. I believe that in the cultivation of our land and in the handling of our products we have reached the highest mechanical efficiency so far attained by any potato grower in this country, but we had to develop nearly every implement to fit the work to be done. We stop at nothing and spare no expense if we think an improvement will make a profit in dollars and cents.

"We are finding an answer to our questions relating to mechanics and power, but we are still far from finding an answer to some of our other questions on varieties, diseases, and soil fertility. We put $100,000 worth of fertilizers on our place this year. Some of the natural questions that come up are: What kind shall we use? How much shall be applied? Can we get as good returns if we use less? Should fertilizers be applied in the fall, spring, or during the growing season? How should the application be made? What are the residual effects of a fertilizer? Some of these questions can be answered in a general way and new things are turning up every day, but when you look for refinements you find them lacking."



Potatoes on the world's record plot just as they fell from the apron of the digger.

A Big Job

WHEN the Zuckermans started farming in 1914 they found many difficulties to be overcome. They had tried to operate their land on the share tenant system, but concluded that they could make it pay better returns by using power machinery and running it themselves. Today there is probably no farm in the United States that produces potatoes so nearly on a factory scale as this one does. As many as 30 bushels of seed are sometimes planted to the acre. The chief varieties grown are Wisconsin Pride, Burbank, and American Wonder. Seed from northern states is shipped to this farm by carloads. The seed is first treated for diseases and then cut. It is planted by a machine that puts it down from 4 to 7 inches deep in rows 26 to 30 inches apart and 10 to 12 inches apart in the row. It does this so accurately that one can rarely find a missed hill in their fields.

After planting, the potatoes are harrowed two or three times with a spike tooth harrow drawn parallelly with the

rows. Cultivation starts as soon as the sprouts come up, for in this rich deep soil the weeds would grow with abandon if vigorous methods were not used to combat them. No weeds are allowed to mature on the Zuckerman farm.

It takes four months to mature a potato crop in the delta. Early potatoes are planted in April and May and harvested in July and August. Late ones are planted in June and harvested in October and throughout the fall.

Fourteen tractor-drawn potato diggers, each capable of harvesting 2½ acres a day, are used at digging time. These machines are marvels of mechanical invention as four men can operate one. One tends the tractor, another the digger, a third the sacker, while a fourth keeps the vines out of the way. The sacks are filled to within six inches of the top and are then loaded onto trucks and carried to the levees where they are washed, graded, and sent down to market in boats.

Washing Machines

THE washing machines cost $1,500 each. It takes five of them to scrub all the potatoes grown on this farm, but they pay for themselves since clean potatoes bring 15 cents a sack above the regular market price. As the potatoes are hauled in from the fields, they are fed into a deep trough containing a rotating washing cylinder that operates under water. They usually come out of this cylinder clean and white, but they are conveyed to a second trough containing pure water for further cleaning. A draper pulls the tubers out of the water, depositing them upon a moving grader belt not unlike those used by the western apple growers. Men stand along this belt to sort out different sizes and qualities and sew up the sacks for shipping.

Zuckerman Brothers believe that every effort expended in marketing their produce in the best condition possible pays.

Another specially designed machine that is getting results is a heavy duty tractor outfit that plows up the dirt much like a lawn mower cuts grass. Similar machines have found favor among the gardeners of Europe. This one takes a strip eight feet wide and will cut any depth down to 16 inches. This pulverizing process seems to be beneficial to the action of soil bacteria as this type of land will stand a great deal of work. It has been found that three plowings and 10 diskings and harrowings have resulted in somewhat larger yields for each operation.

Reclaimed Lands

IN concluding this article it may be well to tell something about this delta region where so many thousands of bushels of farm products are grown every season. As it is possible to cultivate this land 12 months in the year, two crops of potatoes are often dug from the same land in a single year. Three-fourths of California's potato crop is raised in the San Joaquin delta region where there are over 200,000 acres of peat lands made up of tule and other march plants. These soils are in varying stages of decomposition from brown peat to black muck filled with river sediment. The lands were reclaimed by throwing up permanent levees along the banks of the river and sloughs to form islands, many of them from 2,000 to 6,000 acres in size. Before the erection of these embankments, the whole delta flooded at high water stages.

The lands are drained by large canals with the drainage water being pumped into the streams by electric pumps. This allows complete control of the moisture conditions of the soil as it seldom rains here and the water can be let into the irrigation ditches by siphons over the levees or by flood gates through the embankments. The same laterals that carry the irrigation water also drain the land as the ditches are dug in such a manner that subirrigation is practiced.

Making Poor Land Pay

(*From Page 28*)

The first cutting this year.

tons manure and 400 pounds acid phosphate, 3,755; No. 8, with 250 pounds of a 3-12-4 commercial fertilizer, 3,060 pounds. Acid phosphate at $32 per ton was paid for in the first cutting, figuring the hay worth one cent per pound, or $20 per ton. Commercial fertilizer showed up better than the manure. And it has kept that advantage to the present time."

In some of the later tests manure gave slightly better results than the acid phosphate, but when the cost of securing it was taken into consideration it was the more expensive, considering returns. The combination of acid phosphate and manure proved to produce the most growth, though manure made the crop somewhat expensive. In some of the later tests a low grade marl was used at the rates of 2, 4, and 6 tons per acre. It was not as satisfactory as the crushed stone. Burned, slaked lime at the rates of 500, 1,000, 2,000, and 4,000 pounds was used. Its use proved too expensive and impractical.

One of the very best plots in the whole experiment, in fact it was the outstanding one, received 400 pounds of potash per acre. Here was the best stand and the best yield. Evidently potash is one of the limiting factors in this sandy soil.

That year with crop failures all around, the experimental tract received very favorable consideration—but not from everybody. The near neighbors still held back.

"Alfalfa could not be grown here," they would say, even when they were standing in the alfalfa so tall that their hands dangled in it. "No use, it would not grow. . . . If it could be raised here there would be an overproduction, and the price would go down." They took their friends past the plots, proving the failures from those plots where there was no alfalfa. For the explanation of this they did not care. Luckily, the great majority of the people were more considerate. They saw possibilities; they expected results.

More Visitors

THE second year more people came to visit the plots. The second annual field day was more of a success even, than the first. The third was still more successful. The results of the different treatments were graphically shown at the National Dairy Cattle Congress, and Belgian Horse Show at Waterloo, and at the Cedar Valley Fair at Cedar Falls. They

attracted much interest. Other counties in the State began to put in plots of a similar nature. The money from the sale of the alfalfa on the plots now made it largely self supporting, and the acreage and number of plots were increased. There are more than 100 plots in the 10 acres of alfalfa, sweet clover, and red clover, all of it doing well where it has been properly treated and properly fertilized.

The neighboring farmers finally were won over. Drawing a circle with a three and one-half mile radius from the plots, one would find that there are now 56 separate pieces of alfalfa, a total of 604 acres, the tracts ranging in size from two to forty acres. New barns, new sheds, and new homes are going up. Dairy cattle, hogs, and chickens are coming into their own. Farmers are taking new hope. Their attitude has changed.

Driving over the country one notes the change. He sees fields of green alfalfa. Corn this year, for the first time, has followed alfalfa and it is the best corn that has been raised for many years. Alfalfa on land joining the experimental plots sold in the field for $30 per acre. One farmer has been producing five tons of hay per acre, which would cost on the market more than $20 per ton. But better still would be the stories of the men who have found prosperity, satisfaction, and happiness in a new type of farming.

A Success

THIS reclamation project has been a success because it was based on the element of proper cooperation between every individual and every group that would either offer help or who would receive benefit. Every opportunity of advertising was used. The college and extension department had a part. County agents were asked to take part in the meetings and urged to bring their people. At the last meeting the members of the Greater Waterloo association were invited to attend in a body. Special efforts were made to take care of students and others seeking information. High school students were invited. The railroads were glad to give assistance. They offered to haul the limestone free of charge and even furnished some of it. Seedsmen were on the ground, fertilizer companies were glad to assist, editors were willing to give publicity. These efforts were appreciated.

The first part of the work was experimental—rather feeling the way. Finding the correct solution, the work became demonstrational, an object lesson of applied science in the practical field of farming. Like many of our soils projects of today that touch the well being of many people, its interested spectators were as unlimited as its opportunity for useful service.

The Country's Needs

(*Fom Page* 10)

than it does to-day.

The perennial loss of surplus wealth is one of the outstanding causes of a barren country life. Amazingly slow of accumulation, surplus wealth can do much when wisely utilized. Surplus wealth in a nation is the means of culture, civilization.

A national policy of unconcern about country life, about rural standards of living, about the conditions that surround the farm family, many believe, is a move in the direction that has led to the destruction of historic civilizations. Theodore Roosevelt said nearly twenty years ago, "If there is any one lesson taught by books, it is that the permanent greatness of any State must ultimately depend more upon the character of its country population than upon anybody else."

The six and a half million farm families in the United States offer opportunity for such constructive leadership as will promote not only their happiness but the stability and strength of the entire Nation.

Storing for Profit

(*From Page* 12)

would not dispose of the foreign non-storer. Or, you can maintain that pooling should be deferred until an overwhelming proportion of the growers are lined up in cooperative groups. Or you can argue that the solution is not to be found in voluntary grouping, but only in some exercise of Government authority. That view, however, opens up profound questions as to the effect of compulsory pooling on production here and abroad, and on our whole agricultural economy. Moreover, it probably involves too high an expectation of what pooling can accomplish even under the most favorable circumstances.

Difficulty of Price Control

STORING is, theoretically, a means of causing crops to bring more under certain conditions than they otherwise would. It is an approach to the control of the surplus problem. Eventually, beyond doubt, it will play an important part in agricultural marketing, although the precise method by which its costs and profits can be fairly apportioned among all farmers is not clear. That is encouraging.

But ponder the fate of the New Zealand Dairy Produce Control Board's attempt to influence prices by storing supplies of dairy products. It is an object lesson in the difficulty of price control.

The New Zealand Dairy Price Control Act of 1923 set up a board and a London agency to control the export and sale of butter and cheese in the interest of producers. Through control of shipments and marketing it was planned to control prices, or at least to influence them favorably. But a strike of British seamen tied up the board's shipping program. Then came the general strike in Great Britain, followed by a prolonged mining tie-up. Poverty-stricken Britain cut down its consumption of dairy products, and stocks of New Zealand butter and cheese mounted portentously, until in March last they totaled 23,327,000 pounds of butter and 28,120,000 pounds of cheese.

With such accumulation of supplies, the price-control dream faded. New Zealand's dairy products are now sold in Europe at competitive prices.

It was originally the policy of the board to hold butter for better prices whenever the market slumped. This policy was backed up in New Zealand by a legal obligation resting on every dairyman to sell his products exclusively through the board. Competition at the selling end was thus absolutely prevented.

Nevertheless, the board recently acknowledged that it can no longer set prices, but must accept whatever the market will pay. It is now eating humble pie, and trying to square itself with the producers. It has discovered, what every selling organization of farmers must eventually discover, that control of supplies is only half the battle in trying to influence prices. Consumption also must be taken into the reckoning.

The theory of influencing prices by storing surplus products may be all right. But the technique of doing it has not yet been worked out.

Save $5,000,000

IN some years the livestock industry suffered a loss as high as $5,000,000 because of the screw worm. Benzol or benzene, says the Department of Agriculture, is an effective treatment for this pest which results from the eggs laid by the blow fly in an open wound or sore. Many animals "as good as dead" have recovered completely after this treatment.

South Carolina

(*From Page* 20)

work planned, which includes a study of varieties, spacing, time of planting, fertilizing methods, cultural practices, as well as poisoning. After five years of this work, which is now under Dr. George M. Armstrong, it is evident that the Southeast can produce cotton under boll weevil conditions, and confidence has been re-established even to the extent of overproduction. South Carolina is the only state specially organized for the cotton research problem; and the same data and organization is now being used to work out more economical production to meet western competition.

To this end South Carolina is now working with the U. S. Bureau of Agricultural Economics to improve length, strength, and spinning quality of cotton. Spinning qualities of lints from breeding plots are being tested constantly by cotton technologists of the Bureau of Agricultural Economics located at the Clemson College Textile School.

Research with Livestock

THE wonderful world champion Berkshire herd of Clemson College, developed under Prof. L. V. Starkey, chief of the animal husbandry division, under conditions prevailing on average Southern farms, has focused attention on the Palmetto State in the livestock world. This herd, developed from one boar and one sow secured in 1922 and built up through skillful inbreeding, has taken national first rank and has been the admiration of all who have seen it in the show rings for two seasons; and blood from the herd is now beginning to tell in the improvement of Carolina hogs.

Prof. Starkey is now seeking to do with the sheep what he did so well with hogs, and has the foundation of a flock of Hampshire sheep that bids fair to take rank with the Berkshires. He plans also to do similar breeding work with Hereford cattle.

Incidental to experimental work with animals themselves, much work is being done with feeds and feeding. These include especially (*1*) the development of soybeans as a forage, enabling pork production as low as 4½ cents per pound; (*2*) working out a forage crop cycle to make sure pasturage the year round and realize a dollar plus per bushel for corn fed; (*3*) comprehensive work with protein supplements to corn—especially soybean meal, peanut meal, fish meal, tankage, thus effecting a decided saving in balancing the corn ration.

The dairy division, always seeking to furnish information and new knowledge that will induce farmers to make dairying a worthwhile factor in South Carolina farming, has sought more recently with the increased financial support given it, to put its experimental work on a more strictly scientific basis for determining the best dairying practices for this state and section. To this end special attention is centered on production problems, that is, breeding and feeding.

In breeding work important lines of research now well under way and pointing to important results are:

1. A long-time project on the best systems of mating, to study the production of offspring linebred against outcrossed.

2. A study of the amounts of feed materials necessary to grow a dairy animal from birth to producing age.

3. An extensive investigation on changes in body form during growth from birth to maturity, with photographic records.

Heretofore all dairy investigations have been made at the headquarters station at Clemson College, some of them in cooperation with the Federal Bureau of Dairying. Some important work to determine the most suitable

herd size and the best forage and pasturage will be conducted at the new Sand Hills station.

Farm Crop Investigations

A MULTIPLICITY of experiments with farm crops has been conducted for many years, these dealing chiefly with problems of best varieties, best fertilizers and best cultural practices in connection with the main crops of cotton, corn, oats, rye, tobacco, soybeans, and forage crops. Some of these matters are discussed elsewhere in this story. Prof. T. S. Buie is chief of this important division.

The botany division, under direct charge of Prof. Barre, has been of high practical service in studying for public benefit such problems as rusts in small grain, corn root diseases, bacterial diseases of cotton, forestry methods, and in making annually a plant disease survey.

Likewise in the entomology division, besides the big work with the boll weevil already cited, life-history and control studies of the insects of economic importance constitute the main line of endeavor.

A total of 15,000 to 20,000 carloads of fruits and vegetables shipped from the state annually makes it important that experimental work with varieties, fertilizers, cultural methods, etc., be conducted by the Experiment Station. Present varieties and fertilizing practices in general use are those proved best by the station tests. Of special practical importance have been (1) tests in recent years on proper fertilizers for peaches, asparagus, Irish potatoes, and lettuce, four crops of increasing importance; (2) studies in source of seed and in certified vs. non-certified potato seeds (3) variety tests with apples, grapes, lettuce, berries, etc. This work is now supervised by A. M. Musser as acting chief.

In recent years the newly added division of agricultural economics, with Ward C. Jensen as chief, has been conducting a series of surveys and studies in farm management, cost of production, production and demand, marketing of cotton, forms of farm credit, taxation problems, livestock in the farming scheme, home economic and rural social problems, etc., all of which are helping to supply the farmers and the public with data that enable them to pitch operations on a more intelligent basis.

Wheat Profits

(*From Page* 16)

as soon as they further increase the amount of fertilizer per acre applied for wheat.

In the face of the activity they evidence in regard to other far less positive means of attaining their purpose, it is inconceivable how slow farmers have been in appreciating that investments in larger applications of fertilizer is the surest way to make wheat pay best. For instance in the important winter wheat state of Missouri there is used at present only about 40 pounds of commercial fertilizer per acre of wheat grown. Yet the Missouri Agricultural College has consistently demonstrated that the net returns from the right fertilizer properly applied for wheat is 253 per cent for every dollar invested. Again the U. S. Department of Agriculture in a survey of winter wheat production costs finds that a yield of 28 to 30 bushels per acre reduces the per bushel cost of production to one-half of what it costs to grow only 10 to 12 bushels of wheat to the acre. In other words, there is a saving or a direct profit of 72 cents per bushel in the larger yield over the smaller.

Is it possible to produce 30 bushels of wheat in the winter wheat belt consistently? Perhaps not every year on every farm but over a period of years such production could be very nearly approached and at times exceeded. Under perhaps a bit more favorable growing conditions the United Kingdom average yield of wheat is close to 32 bushels to the acre. Denmark farmers average nearly 43 bushels to the acre. Yields of 45 bushels of wheat per acre on well fertilized land have many times been secured at the Ohio Agricultural College Farm and yields of 35 bushels to the acre have been harvested on the Missouri Agricultural College plots. In fact yields of wheat as large as 108 bushels to the acre have been reported by farmers in various states during recent years.

In addition to the necessity for a wider and more generous use of commercial fertilizer as an adjunct to lowering production cost there is the further advantage of improved quality of crop and the premium it brings. Every year thousands of farmers take losses by marketing wheat of inferior quality and to a large extent this could be avoided. The test weight of wheat is influenced by its color, moisture content and the proportion of weed seeds it contains. As much as a pound in test weight per bushel can be lost when uncapped or carelessly shocked grain is exposed to a single heavy shower. Similarly to thresh too soon after harvest or after exposure impairs the quality of the grain.

Considerable damage to wheat by poor storage also is common and can in a large measure be avoided. Again prior to the sale if the wheat is infected with weed seeds or dirt it should be cleaned. However, this requires special machinery and it is costly. The better way to insure clean wheat of good quality is to sow good seed on clean ground and rogue any straggling noxious weeds from the field prior to harvest.

Now forgetting about ten yeears hence and considering only the coming year's outlook, the season 1927-28, intentions to plant reveal that very nearly a normal acreage of wheat will be sown. If an exceptionally good crop is harvested and satisfactory prices prevail, which seems probable in view of no surplus wheat likely entering into the situation, farmers ought to make money. Those who get the biggest yields per acre will profit most no matter what the market price proves to be. This is always the case. A notable example of how profitable production can be accomplished in the face of expensive lands and present day labor costs is the present production of rice in California by efficient methods at a cost which permits the growers to ship the product to China and compete with the domestic product grown with labor worth 15 cents a day. What is being done with rice can be accomplished likewise with wheat. Wheat lends itself admirably to culture and harvest on an extensive scale by improved power machinery. Farmers haven't begun to grow wheat at a minimum production cost in this country. With better tillage, planting the most prolific varieties, fertilizing more generously, and harvesting more efficiently the United States could feed the world with its full requirement of breadstuffs.

Barring unfavorable growing conditions and the production of normal crops both here and abroad, there isn't much chance that the price per bushel farmers will receive next July or at succeeding harvest will be much higher or lower than now prevail. This should not be discouraging when viewed from the means available within in this hypothetical limitation for increasing the returns from this crop. If returns remain constant or even decrease somewhat it is still possible to make handsome profits if production costs are materially cut. Farmers, therefore, in the states where winter wheat finds its natural habitat would be foolhardy to abandon its culture when the crop fits so perfectly into the system of farming.

"KING POTATO" *is* Crowned

By ALBERT E. WILKINSON

Connecticut Agricultural College

HUMANITY paid due homage to King Potato at the big potato field day held last fall on the farm of L. L. Grant, Buckland, Conn. Several hundred men, women and children crowded the field to view the bumper crop being harvested.

To the Hartford County Farm Bureau and its hustling agent, Benjamin G. Southwick, is given the credit for organizing and carrying through the day's program. Potato King, Louis L. Grant, a very close cooperator with the Farm Bureau and the Connecticut Agricultural College, was glad to hold the big demonstration. Up until five years ago Mr. Grant grew nothing but tobacco; then because of marketing difficulties, he changed to potatoes and now he has the enviable reputation of being the largest potato grower in the state.

A measured acre was used for the field meeting. It was anticipated that this acre would produce 500 bushels of potatoes. The potatoes were dug and weighed with the crowd looking on. The most spectacular feature of the meeting was a guessing contest on the yield from the measured acre. No effort was made to select the best acre on the farm but an acre was selected that was convenient to the roads and therefore to those coming to the meeting. The acre yielded 489 bushels of marketable potatoes.

In 1925, Mr. Grant, grew 72 acres of potatoes at Buckland, harvesting 23,000 bushels from this acreage. Last year, in anticipation of heavy planting generally and the possibility of lower prices, he planted but 53 acres. Of 300 bushels of potatoes graded as a test, only three bushels fell below No. 1 grade.

Good seed is a shibboleth on the Grant farm. Only northern-grown, certified seed is used and as Mr. Grant believes there is as much difference between strains of certified seed as between certified and uncertified seed, he insists on inspecting his seed supply in the field. In September he spent 11 days driving through the potato sections of New York, Vermont and Maine, looking for the best seed obtainable. On this 2,000 mile trip he bought not only his own seed supply for next season but purchased several carloads for growers who rely upon his judgment.

By selling only what the market can readily absorb and distributing the sales over a period from November 1 to April 1, Mr. Grant does his part to hold up the market for local growers.

An old cow barn has been converted into a storage shed without much expense. A tobacco shed has been converted to the same purpose. The tobacco shed was boarded and papered inside, a ceiling put in, a raised floor built and a boiler and hot water pipes were installed. Eventually he expects to build a permanent storage house, using most of the material from the tobacco shed.

Mr. Grant has figures to indicate that he can store potatoes from November to April at a cost of about 10 cents a bushel. The potatoes are sacked in the field, hauled to the shed and stored without grading. As the

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The Soil Robber

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forestation is a synonym of soil conservation. The wood will be sorely needed, and every acre of sloping ground upon which timber is growing will contribute to the protection of fertile downstream valley lands.

If the farmers of the rolling parts of the country could be brought to see the importance of reorganizing their fields to the point of turning over all lands that can not be protected from ruinous erosion by terraces or sod to wood lots, a very long step would be taken in the direction of land conservation. In some sections this is beginning to be done. Farmers are coming to look upon timber, even in small patches, as a valuable crop. More than ever before they are protecting young trees from fires, and are hesitating about making new clearings.

Some of our pines, as the shortleaf and slash, grow with such remarkable rapidity, even under conditions of adverse soil, that with protection from fire and the foraging of the hog, known as the "piney woods rooter," it is possible to establish almost immediately an excellent growth on land where profitable farming can scarcely be hoped for. This applies to millions of acres over an immense territory.

Returns will begin to come in much sooner than expected. A tree of almost any size nowadays is valuable for pulpwood. Furthermore, good stocks of the young trees will increase in value every year, and where there is a considerable area of young forest, as might readily be established in thousands of localities by concerted action among the owners of land duly encouraged by light taxation upon such enterprises, the growing timber will be sure to come more and more into demand by lumbermen with an eye on the future.

The writer is familiar with numerous localities where second-growth pine has kept farmers going in spite of short crops and low prices. The writer owns land that was destroyed by erosion, insofar as having value for farm crops, 75 years ago. From this one crop of timber has been removed, a second crop is ready to cut, and a good start on the third cut will be left by the axemen.

This land was so gullied that whole houses could have been dumped into the ugly ravines, some of which are still of huge dimensions. But pine trees took to the land, growing everywhere except on exposed rock and the raw clay of the gulley sides. Trees springing up in the bottoms of the gulches finally arrested erosion and turned the process around to soil building, with consequent filling of many gullies. The land should never have been cultivated in the first place, because of its extreme susceptibility to washing. It would have given much better profits in timber.

This applies to millions of areas throughout the nation. In the southeastern states alone careful appraisal of the region on the basis of the different types of soil shown on Government maps reveals the presence of 64,000,000 acres of land which is better suited to timber than to anything else, and of 90,000,000 acres of unimproved land, much of which could well be used for forestry and grazing while awaiting occupancy.

The Hillside Terrace

ALTHOUGH erosion can not be completely stopped in cultivated fields, it can be reduced to a minimum by the building of terraces along slope contours to check the speed of run-off water. The cutting power of flowing water is enormously enlarged with increase in the rate of flow; conversely, the biting edge is reduced by placing obstacles in its path to check the flow. The hillside terrace effectively does this by turning the water aside to flow away gradually

This field of inert chalk formerly consisted of highly productive prairie land in Central Mississippi. The gullies that could easily have been destroyed in the beginning were not attended to, hence this devastation. These despoiled white areas dot the landscape, not only in the prairies of Alabama and Mississippi, but in many parts of the Texas Black Belt.

along the contours.

In the Piedmont and many parts of the older coastal plain states these terraces have been in use for more than 80 years. While much land has been washed away in these sections, millions of acres that surely would have been destroyed have been saved by terracing, and are today producing about as well as they did before the Civil War.

It is difficult to understand why this efficient system of soil conservation has not spread far beyond the localities referred to. Only recently has terracing come into common usage in Mississippi, and it is just now getting over into Central Texas. Perhaps it was necessary that many farms should be severely impoverished before the necessity of putting a halt to the evil thing was sufficiently impressed upon the owners of farm land.

In the central states, where sheet erosion, and in some localities gulley erosion, is rapidly wasting the fertility of sloping areas, terraces are almost never seen. They are needed very badly in many parts of these states, and it is time that farmers, bankers, merchants, railroads, and county agents were seriously busying themselves with doing something about it. There is immediate need for active campaigning against this form of land wastage. It requires more than advice and words to get reforms of this nature started.

Actual demonstrations of the effectiveness of terraces and of restocking wasting slopes with trees and grass are needed all through the areas of more vulnerable land. There is need also for further investigations in perfecting methods of terrace construction, especially in the matter of adjusting different types to varying slopes and soils. More information is needed about the distribution of those soil varieties on which cultivation can not be safely carried on under any condition of slope protection. It seems little less than a crime that with all the research organizations of the hundreds of different kinds in the country, but one single type of soil has its rate of wear under erosion measured.

The problem of erosion is too seriously interwoven with both the present and future welfare of our nation to be laid aside as something that concerns only the farmer. If ever a national problem existed this one is most outstandingly of that kind. We have

been lamentably unmindful of the seriousness of the scourge, and to lessen the evil there should be immediately widespread effort on the part of the nation, the states, counties, and the citizens thereof, in furthering large programs of terrace building and the planting of forests and grass upon steeply sloping lands and those types of soil that are known to be highly susceptible to erosion.

Looks

(*From Page* 4)

posite direction at the time with a set of standards all his own. Your job and mine is to get the right standards.

WHAT, then, is a good looking man or woman but a reflection of an ideal in our own inner minds? Clothes may enhance appearances here and there, or hide or mar the effect, but the keen eye of the wholesome beholder soon finds the wholesome answer.

Here I find Walt Whitman saying: "The expression of a well made man appears not only in his face; it is in his limbs and joints also, it is in his walk, the carriage of his neck, the flex of his waist and knees. Dress does not hide him. The strong, sweet quality he has, strikes through cotton and broadcloth."

Each of us has some goal of perfection in form and face to seek. If I take up Matthew Arnold for a bit of further enlightenment, I note his logic: "The pursuit of perfection is the pursuit of sweetness and light. He who works for sweetness and light works to make reason and the will of God prevail."

Wholesomeness is the first requisite of good looks. Fitness of purpose is the other attribute, but it is illusive and indefinable. It is sometimes beyond the human eye.

Abe Lincoln, our own homely-heroic figure, said that a man's legs ought to be long enough to reach the ground. In that remark he preached a ton of evidence sustaining my contention that fitness of purpose is the second necessity for harmony of appearance.

OF course, we agree that a first-rate prize fighter is a fine looking animal, but the only way you and I can tell the result when two such specimens combat is to wait for the gong.

Three fighters who would not measure up to ordinary visual standards come to mind. Alexander of Macedonia was small with a twisted neck. He conquered the world in his time, but the kid in McGuffy's reader asked, "How *big* was Alexander, Pa, that people called him great?"

Napoleon, who was only five feet six inches tall, chose the human nose for his index of scrapping tendencies. He picked all his generals by the size and shape of their nasal organs. If you wish to know definitely, they had to be prominent and acquiline.

Paul, the Apostle, formerly Saul of Tarsus, was no mean fighter in his day, both physically and morally. Yet they tell me Paul was undersized, frail, and had weak eyes.

Gen. Winfield Scott Hancock was defeated for the presidency. He lost, not because of his looks or because of a lack of a war record, but because Charles A. Dana made that mean crack about him, saying, "He is a good man, weighing 250 pounds!"

The President is usually the most "looked at" man in the country. Presumably, the holders of that office should be chosen for their magnificent and stately appearance. I recall, however, that one argument used against woman suffrage was that the ladies would all vote for the best looking candidate. Apparently, this has since been disproven, both to their credit and perhaps to the welfare of the nation.

Who's Who in America does not give data bearing upon our subject. However, a frenzied seeker after zest-

ful journalism in New York is circularizing all the dignitaries whose names appear in the red tome, asking them to give certain physical facts appertaining to the question of the relation of success to good looks. I am afraid not a few of the requests will be unanswered for obvious reasons. I, for one, shall remain forever silent.

From this dubious venture the worthy editors no doubt hope to collect a composite picture of the upstanding, purposeful American—but I fear he will have one gray eye and one that is partly black and blue.

At any rate, this set me to gazing upon the dim features of the Presidents, as they appear in histories and as their physical attributes are described by men of their times. The result has convinced me that looks taken as a gauge of achievement are really a blandishment and a snare.

MY little son, who resembles me perfectly, has his proportionate hope of being President, and the survey I have made lends much encouragement to his faith in the future—much more than his direct inheritance warrants.

Of 30 Presidents we have enjoyed, only four of them were men of more than six feet tall. Lincoln topped the list with six feet and four inches, and the other big ones were Jackson, Jefferson and Washington.

James Madison, known as the Father of the Constitution, was five feet and six inches tall and weighed only one hundred and ten pounds. Alexander Hamilton, who sought the high office, and who was one of the giants of his day in intellect, proved out to be only a small chap in height and avoirdupois.

Taft and Cleveland tipped the scales down the most, while the plum for the handsomest of the Presidents must go to Gen. Arthur and Franklin Pierce.

I have learned by the research done in your benefit that being President does not relieve some folks of the natural desire to be good looking. One would imagine that a fellow who got that high could afford to look like Andy Gump without hurting his conscience.

Martin Van Buren, suave and soggy in appearance, was succeeded by Gen. Harrison. When Mrs. Harrison moved into the White House and started to renovate the rugs, she noticed with chagrin that the spot right in front of the mirror in the President's private room was worn to shreds by the gay and festive Martin Van Buren, who liked to admire his reflection when state duties were not arduous.

I GET from this that the three presidents who were the prettiest men, as well as the one who yearned to be a Beau Brummel, have achieved places among the least of those who occupied the chair.

Looks are therefore no index of actual worth in statecraft, and in the realm of economics they are of chief value in the movies and on the stage. I have purposely omitted their possible economic value before a jury in an alimony case, because with so many women now hovering around for a chance at the jury box their effect is going into an eclipse.

Beauty in a child inspires adoration. In a woman it inspires admiration. In old age it inspires veneration. But adoration, admiration, and veneration are inspired besides and above all else by something within the face and form we gaze upon that transcends all the superficial elements of grace and color.

Character, motives, breeding, culture, refinement, ideals,—all these and much more haunt and hold us as no mere regularity or consistency of features can hope to do.

The making of a wise and gentle face is the work of years and the fruit of victory and sacrifice. Inability to sense this fact deprives us of more pleasure than actual physical blindness.

Let's open our eyes a little wider and see if we cannot observe some of those good looks we have missed.

"King Potato" is Crowned

(*From Page 59*)

market demands, he grades in storage, sacks the potatoes in two-bushel bags with his name on the bag and sends to market. This plan calls for minimum handling and distributes the labor over a longer period.

Here are a few points taken from Mr. Grant's explanation of his own methods:

He plants only northern-grown, certified seed of good strains, personally inspecting the fields in which the seed is grown. He plants in 3-foot rows, 13 inches apart in the row, allowing about 13,000 hills to the acre. The rows are run as straight as he can make them, making cultivation easier and spraying more effective. He wants the spray on the plants instead of between the rows, and straight rows make this possible. He used a ton to the acre of 5-8-7 fertilizer, some ready mixed and some mixed to formula. This year he used at least 2,500 pounds of fertilizer to the acre. He sprayed seven times last year, the last spraying on September 11. He experimented with both spraying and dusting and decided that spraying is cheaper and more effective. He uses a home-made bordeaux mixture, 150 to 200 gallons to the acre at one spraying. At the first spraying he uses 5 pounds, copper sulphate, 5 pounds lime, 50 gallons of water. As the vines grow he increases the chemicals until at the last spraying he is using a 8-8-50 formula. He got control of the potato leaf hopper last year with his spraying but has been unable to control the flea beetle satisfactorily. He uses nicotine sulphate for aphids. He had no blight last year.

Power machinery is used where possible. The latest, most efficient types are preferred. Economy and not expense is the watchword. He has two planters, two power sprayers, a power duster, and two diggers. Tractors or four-horse teams furnish motive power. He sees but little difference in cost or efficiency between the tractors and horses.

Yearbook of Agriculture-1926

IT is always a sound business policy in any industry to check up on work done, review the situation, and look into the future possibilities. With this in mind the United States Department of Agriculture since 1894 has published regularly a summary of its present and projected work.

Containing more than 1,300 pages, the Yearbook of Agriculture for 1926, which is just being distributed, is as complete and interesting a volume on American agriculture as can be found. In preparing his report, Secretary Jardine brings out that the Yearbook reaches more persons than any other book on agriculture issued anywhere in the world.

While the bulk of the circulation is among farmers, the book does not deal with elementary facts which every intelligent farmer knows. It does give the farmer the new discoveries and up-to-date information from every phase of agriculture.

The information in the book is arranged for ready reference, and many illustrations add interest. The editors, Nelson Antrim Crawford and A. P. Chew, are to be congratulated for their efficiency in the preparation of this volume.

SLIGHTLY NERVOUS

An English barrister, after a particularly trying day, came home with his nerves on edge and at once sought refuge in his own study, well away from the noises of the household machinery.

He sat down by his fire and was gradually getting calmed down when the cat, which had been sitting there, too, got up slowly and walked across the room.

The master turned on her and said indignantly: "Now, what are you stamping around here for?"

And yet we can't help sighing some for the good old days when men were men and women weren't.

EWING GALLOWAY

Keeping Cool in August

HOLDING HIS OWN

"Whatever you tell a man goes into one ear and out of the other," angrily snapped the wife because her husband had forgotten to mail a letter.

"Yes," he retorted, "and whatever you tell a woman goes in at both ears and comes out of her mouth."—A. K. Montana.

Dumb—"Talking about babies, you know my father weighed only three pounds when he was born."

Dumber: "You don't say. Did he live?"—*Rammer Jammer.*

Frosh—"Why don't baby talk?"

Junior—"He can't talk yet. Young babies never do."

Frosh—"Oh, yes, they do. Job did. I read in the Bible how Job cursed the day he was born."—*Flamingo.*

Cop—"Who was driving when you hit that car?"

Drunk (triumphantly)—"None of us; we was all on th' back seat."—*Virginia Reel.*

THE MEANEST MAN

Mitzi: "I heard that the guy you were out with last night is awfully stingy."

Fritzi: "Stingy? Dearie, if he'd 'a bought me a bag of peanuts I'd 'a' got shell shock!"

Potash Salts

Muriate of Potash	80-85% KCl
Sulphate of Potash	90-95% K_2SO_4
Sulphate of Potash-Magnesia	48-53% K_2SO_4
Manure Salts	30% K_2O
Manure Salts	20% K_2O
Kainit	14% K_2O
Kainit	12.4% K_2O

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